GE Medical Systems

Technical
Publications

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Revision 5

LOGIQ™ 400
Proprietary Manual

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- **ESTE MANUAL DE SERVICIO SÓLO EXISTE EN INGLÉS.**
- **SI ALGÚN PROVEEDOR DE SERVICIOS AJENO A GEMS SOLICITA UN IDIOMA QUE NO SEA EL INGLÉS, ES RESPONSABILIDAD DEL CLIENTE OFRECER UN SERVICIO DE TRADUCCIÓN.**
- **NO SE DEBERÁ DAR SERVICIO TÉCNICO AL EQUIPO, SIN HABER CONSULTADO Y COMPRENDIDO ESTE MANUAL DE SERVICIO.**
- **LA NO OBSERVANCIA DEL PRESENTE AVISO PUEDE DAR LUGAR A QUE EL PROVEEDOR DE SERVICIOS, EL OPERADOR O EL PACIENTE SUFRAN LESIONES PROVOCADAS POR CAUSAS ELÉCTRICAS, MECÁNICAS O DE OTRA NATURALEZA.**

ATENÇÃO

- **ESTE MANUAL DE ASSISTÊNCIA TÉCNICA SÓ SE ENCONTRA DISPONÍVEL EM INGLÊS.**
- **SE QUALQUER OUTRO SERVIÇO DE ASSISTÊNCIA TÉCNICA, QUE NÃO A GEMS, SOLICITAR ESTES MANUAIS NOUTRO IDIOMA, É DA RESPONSABILIDADE DO CLIENTE FORNECER OS SERVIÇOS DE TRADUÇÃO.**
- **NÃO TENTE REPARAR O EQUIPAMENTO SEM TER CONSULTADO E COMPREENDIDO ESTE MANUAL DE ASSISTÊNCIA TÉCNICA.**
- **O NÃO CUMPRIMENTO DESTE AVISO PODE POR EM PERIGO A SEGURANÇA DO TÉCNICO, OPERADOR OU PACIENTE DEVIDO A' CHOQUES ELÉTRICOS, MECÂNICOS OU OUTROS.**

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- **SI PROCEDA ALLA MANUTENZIONE DELL'APPARECCHIATURA SOLO DOPO AVER CONSULTATO IL PRESENTE MANUALE ED AVERNE COMPRESO IL CONTENUTO.**
- **NON TENERE CONTO DELLA PRESENTE AVVERTENZA POTREBBE FAR COMPIERE OPERAZIONI DA CUI DERIVINO LESIONI ALL'ADDETTO ALLA MANUTENZIONE, ALL'UTILIZZATORE ED AL PAZIENTE PER FOLGORAZIONE ELETTRICA, PER URTI MECCANICI OD ALTRI RISCHI.**

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- 忽略本注意事项会对维修员，操作员或病人造成触电，机械伤害或其他伤害。

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1	July 23, 1996	System software version 3.00 console release
2	March 10, 1997	System software version 3.10 console release
3	December 17, 1997	LOGIQ™ 400CL console release
4	June 24, 1998	System software version 3.40 and 3.41 for CL console release
5	April 21, 1999	System software version 4.01 and 4.02 for CL console release

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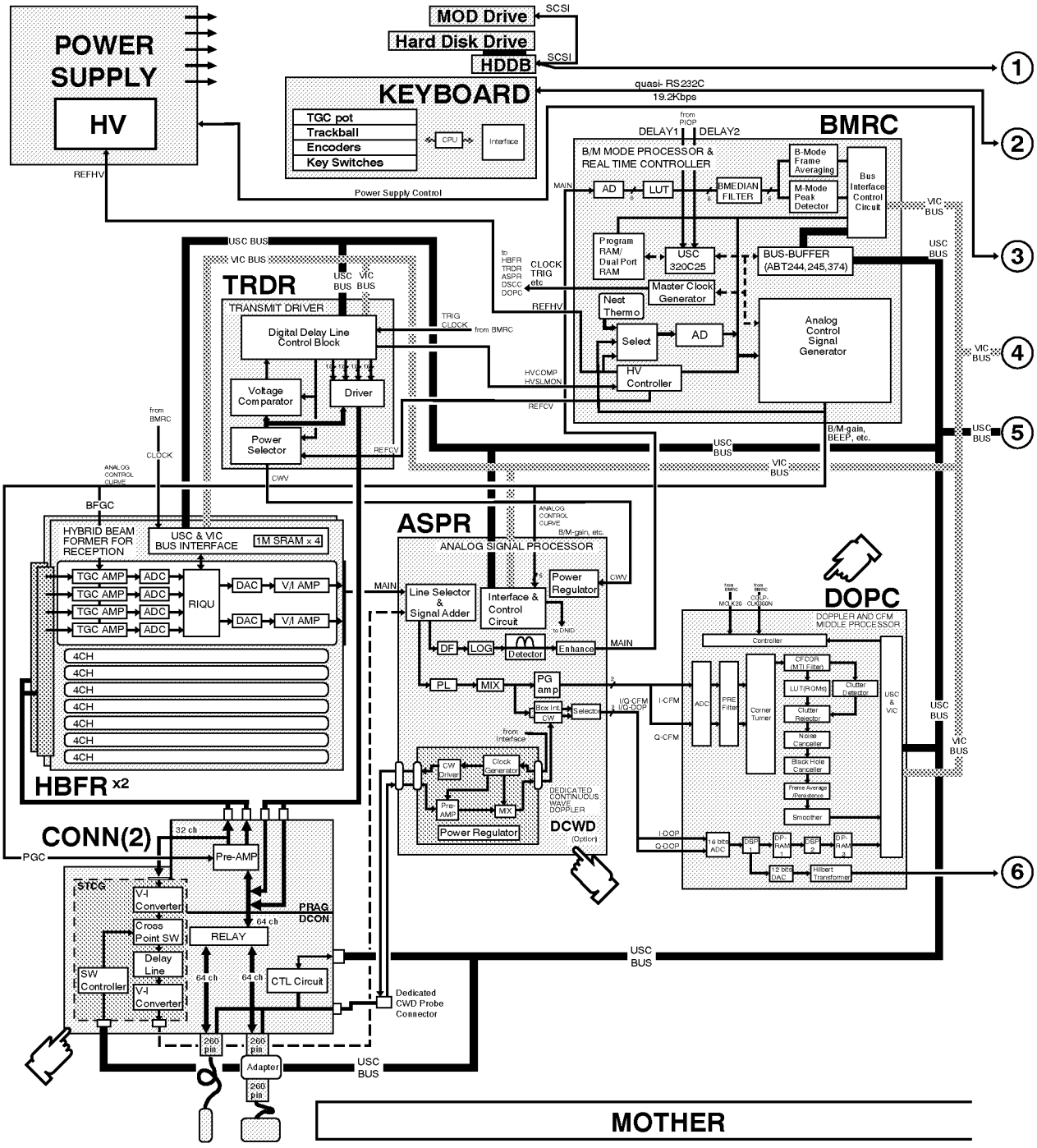
1–1 INTRODUCTION

The LOGIQ™ 400 has a 64 channel beam–former that digitizes the RF signal. This system also features many advanced image processing controls. Gray scale interpolation and motion selective frame averaging improve the 2D image data.

1–1–1 LOGIQ™ 400 Block Diagram

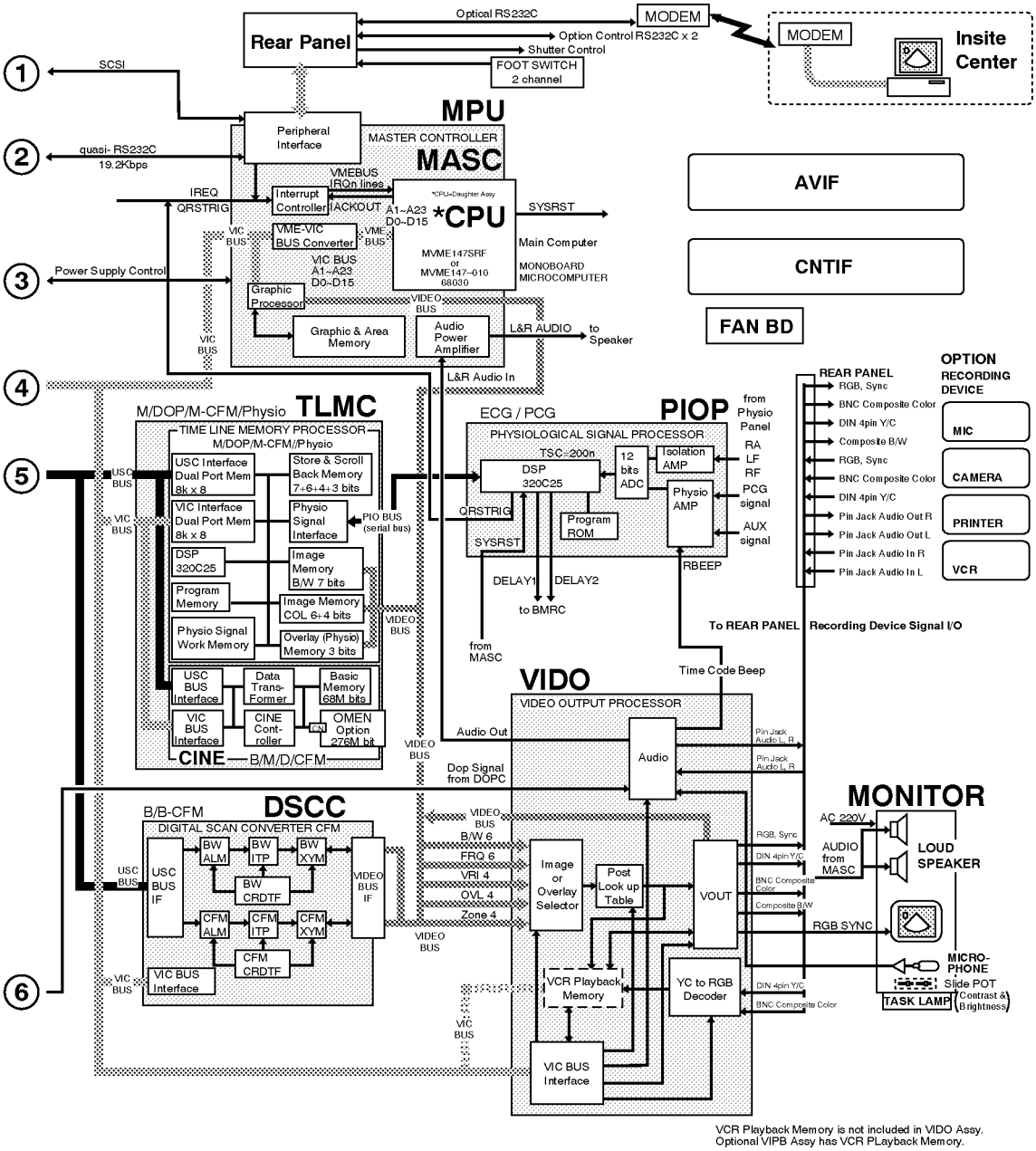


LOGIQ™ 400 BLOCK DIAGRAM (COLOR MONITOR SYSTEM) (1/2)
ILLUSTRATION 1–1

Note

The STCG Assy is the additional PCB for the optional steerable CWD. This is available for the console with the system software version 3.00 or later.

1–1–1 LOGIQ™ 400 Block Diagram (Continued)



LOGIQ™ 400 BLOCK DIAGRAM (COLOR MONITOR SYSTEM) (2/2)
ILLUSTRATION 1–2

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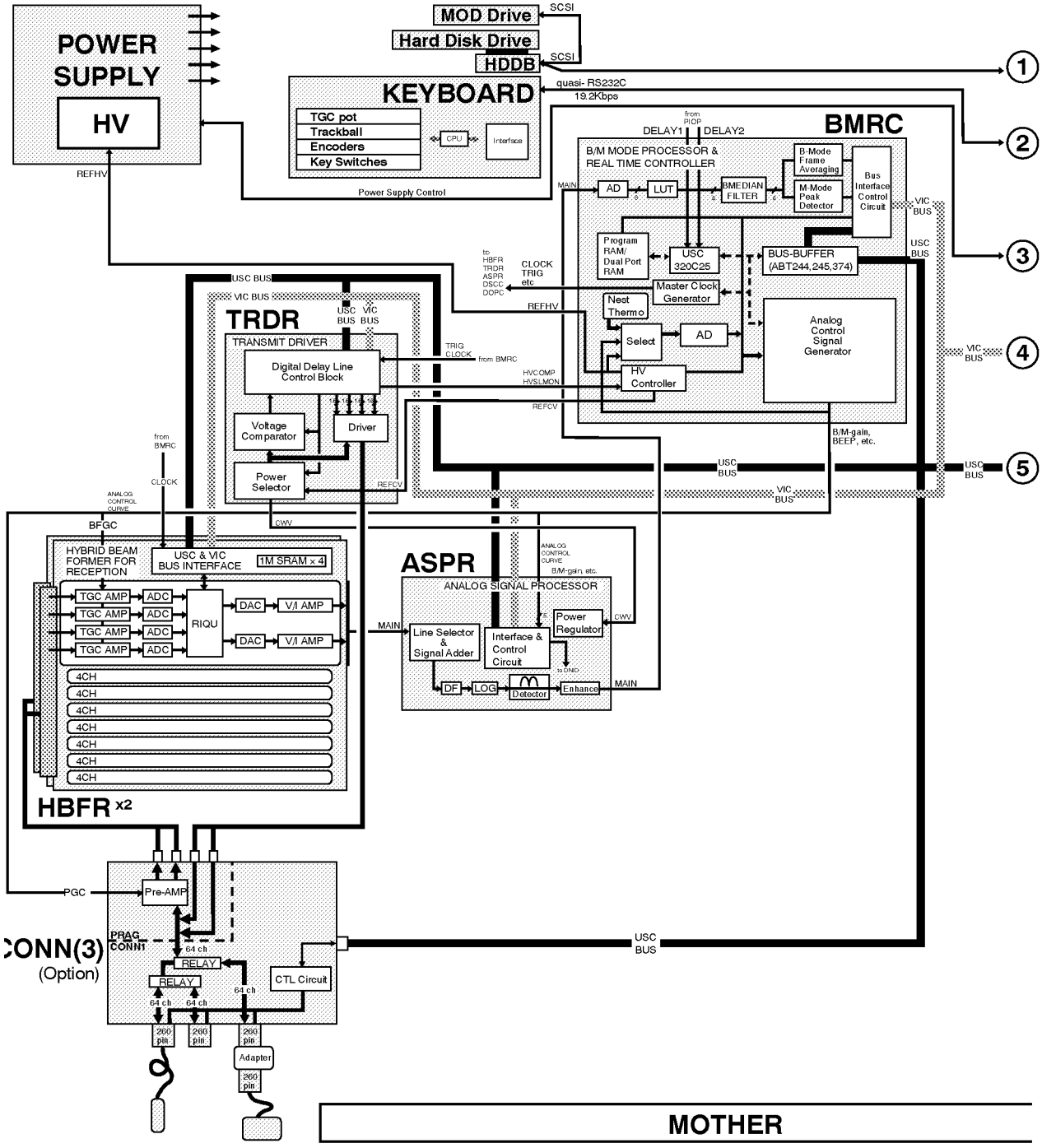
1–1–1 LOGIQ™ 400 Block Diagram (Continued)



LOGIQ™ 400 BLOCK DIAGRAM (B/W MONITOR SYSTEM) (1/2)
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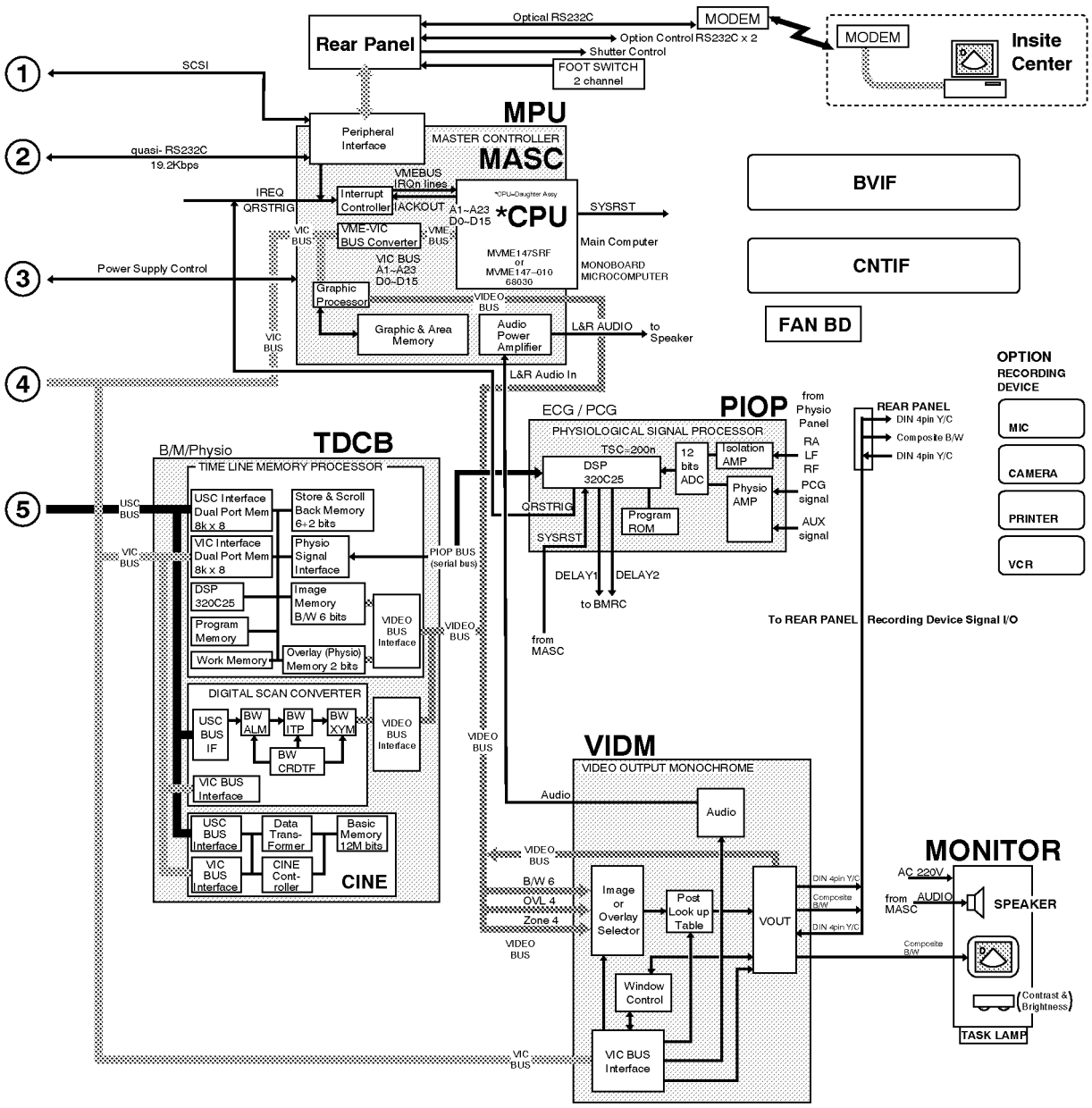
1–1–1 LOGIQ™ 400 Block Diagram (Continued)



LOGIQ™ 400 BLOCK DIAGRAM (B/W MONITOR SYSTEM) (2/2)
ILLUSTRATION 1–4

1–1–2 LOGIQ™ 400

System features

The key design goals of this system are:

- High Image Quality
- Increased User Productivity
- Multiple Clinical Applications
- Planned Upgradeability
- Higher Mobility

Types of Applications

The system supports many clinical uses. Scan and display parameters may be user selected to default to desired values for each application. The system presets many parameters to clinically determined, optimal values.

- Radiology
- Cardiology
- OB/GYN, and
- Vascular

New design

User surveys and the latest technology were employed to increase console ease of use. Digital circuitry enables more reliable and precise operation.

Faster service

Not only does up time increase due to the digital design, built–in diagnostic testing and tracking enable faster service response. GE Service can access this information remotely if the unit is in warranty or the customer signs an optional InSite Package Agreement. To enable this access, the customer must provide a dedicated, analog phone line. GE's National Support Center (NSC) can upload and download information for or about the customer's unit enabling rapid resolution of a problem.

1–1–2 LOGIQ™ 400 (continued)

Subsystems

The system has one card cage that can be described by four functional subsystems: the kernel, beam former, mid processor and back end processor.

Data flow

The ultrasound data path begins by translating the operator's requests into commands and scan sequences which have (vector parameters) delivered at the right moment to the appropriate circuit boards. Strong radio frequency (RF) beams are transmitted and weak beams are received between the beam former, probe and the patient. VME147S is provided as master–controller for the entire system. The VME147S is a VME bus but serves as VIC bus (variant of the VME bus) for the mother–board to control each of the subsystems. The BMRC board controls the scan using a master clock located upstream of the BMRC board. The BMRC board controls the USC bus to control data which are to be controlled real–time and also controls the data transmission from the mid system to back system through the USC bus. VIDO generates video clock, etc. The MASC board generates a graphic and the DSCC board generates area signals for B, M, CFM, etc.

TABLE 1–1
A SUMMARY OF THE FOUR SUBSYSTEMS

Subsystem	Description
Kernel	• Controls all HW components delivering coefficients and control signals via the VIC, software, and SW memory maps. • Delivers data needed to form the requested beam, process the echo, and convert the scan to an image through the Scan Control bus. • Interfaces the outside world to the unit, and the Front End to the Back End. • Generates test pattern.
Beam–former	• Generates and transmits sound waves through the probes. • Steers, amplifies and focuses the transmit beam. • Receives and amplifies the echoes from the patient. • Dynamic beam forming
Mid Processor	• Process data for the gray 2D and Motion images (B and M modes) and gray scale, and adds any user selected B or M processing. • calculates for the color overlay, blood velocity, turbulence, and power for all potentiometers within the user selected region, then outputs B color data to DSCC and M color data to the TLMC. • computes the power of the frequency shift caused by flowing blood and converts it to pixel and audio signals for the Doppler image and audio.
Back End Processor	• Transforms processed data from polar coordinates (RΘ) to digital pixel (X, Y) values, then to analog RGB. • Enables multiple image display and annotation. • Handles the optional, physiological (ECG) data inputs. • Stores and buffers images for CINE.

1–1–2 LOGIQ™ 400 (continued)

Scan Modes Summarized

Types of Scan Modes

There are several ways to acquire and present patient information as listed below. These scan modes can also be used in combination. Color may be overlayed on both the B and M images. Only one type of timeline image, M or Doppler, may appear with each B image. Up to four images be displayed at the same time.

TABLE 1–2
PURPOSE OF EACH SCAN MODE

Scan Mode	Reason to use	What the system does	How to use
B	To see a two dimensional black and white image of patient anatomy. It may be either updated periodically (will put black bar on timeline) or continuously (survey).	The system maps the echo source locations and intensities as display pixels. A pixel is one element of the monitor. The brightness of each pixel represents the strength or amplitude of the returning echoes. Normally, the system shows the strongest echoes with the brightest pixels.	Begin exam with basic image.
M	To see and measure a graph of motion, such as heartbeat or valve motion.	The system plots the brightness and depth information against time. This is useful for detecting fetal heart beats and other cardiac functions.	Scan time the same as B. Can zoom both.
Color Flow (CFM system only)	To locate specific arteries, veins, or fluid motion in the B or M image.	The system assigns a color to blood flow direction, velocity and variance.	
PW Doppler (CFM system only)	To measure blood flow velocity or turbulence at a specific scan depth.	The system samples one specific location to report several parameters of blood flow within the Sample Volume.	
CW Doppler (Option only for CFM system)	To find and measure very fast blood flow anomalies. A split crystal (pencil) probe is useful when there is a very small echo window.	The system samples all tissue in a line with the probe to accurately measure high velocity blood flow. You can steer the CW beam if you use a 2.5 or 5.0 sector probe. There is no 2D image with a pencil probe.	PW aliases. Do not use a linear probe.

Note

The CW Doppler is not available on the LOGIQ™ 400CL console.

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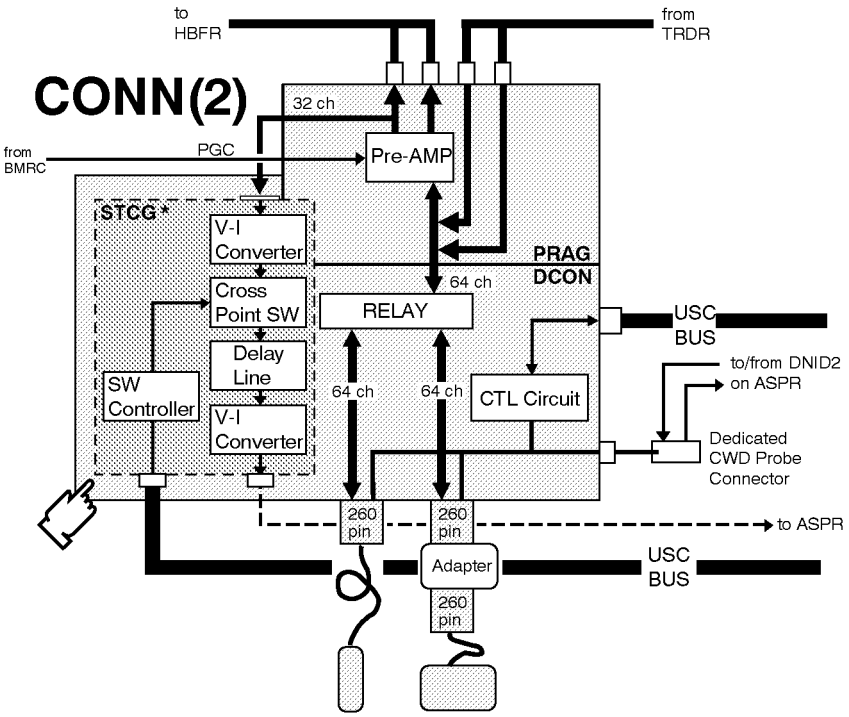
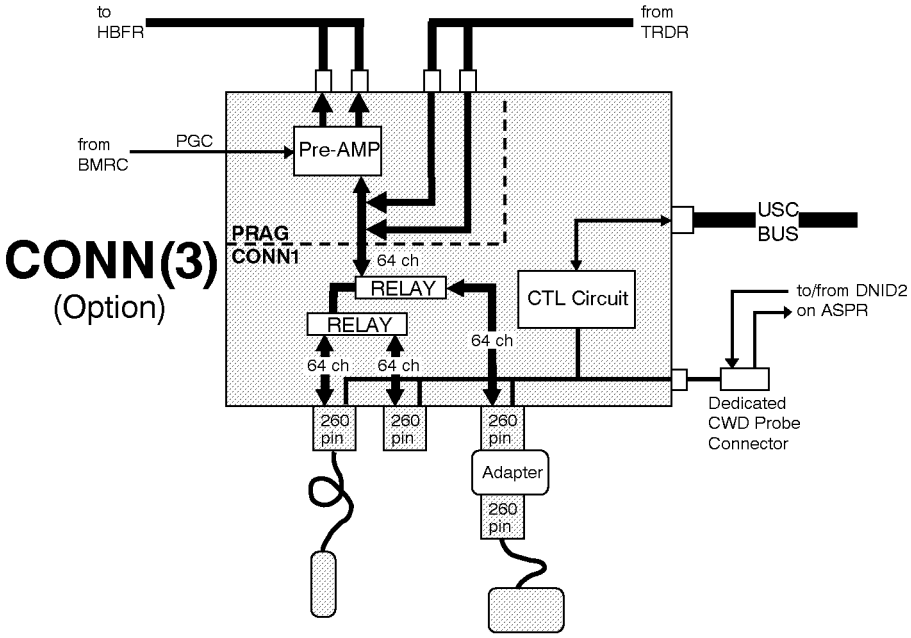
1–2 CONNECTOR (CONN(2), CONN(3)) ASSY

1–2–1 Connector Assy Block Diagram



*** NOTE:** STCG Assy is optional PCB for the steerable CWD option which is available on the console with the system software version 3.00 or later.



CONNECTOR ASSY BLOCK DIAGRAM
ILLUSTRATION 1–5

1–2–2 Connector Assy Overview

Two types of the connector assy are provided. One is 2–slot type, CONN(2) Assy and another is 3–slot type, CONN(3) Assy.

The Connector Assy connects the probe connector selected by the user to the transmission and reception circuits of the main system. The user selects one of the three probes connected to the main system to enable ultrasound transmission and reception. Also, this circuit board provides an interface between the digital circuit in the scanner IC of the probe and the USC bus in the main system.

These assemblies consist of two board assemblies, respectively. The CONN(2) Assy consists of Dual Connector (DCON) and Primary Receive Amp Group (PRAG). The CONN(3) Assy consists of Connector 1 (CONN1) and Primary Receive Amp Group (PRAG). Dual Connector Assy (DCON) and Connector 1 Assy (CONN1) act mainly as a probe select circuit and USC bus interface circuit, and Primary Receive Amp Group Assy (PRAG) acts as a reception preamplifier.

1–2–3 Connector Assy Block Diagram Explanation

The Connector Assy can be further divided into DCON, CONN1 and PRAG as follows.

A. Dual Connector (DCON) and Connector 1 (CONN1)

1. Control Circuit (CTL Circuit) : Interfaces with USC bus. Under the control of the USC bus, it controls the probe selection, power supply, and digital circuit in probes with built in Scanner IC. Also this block sends, over the USC bus, information on the probe connection, information on the type of a probe, and information on the source voltage applied to the scanner.

2. Relay : Acts like a switch to connect one of the probes to the transmission/receipt circuit.

B. Primary Receive Amp Group (PRAG)

1. Preamplifier (Pre–AMP) : The preamplifier is 64–channel reception amplifier. The reception signals are sent to the Hybrid Beam Former for Reception (HBFR) Assy.

2. Signal :
   - PGC : Pre–gain Control signal for the PRE–AMP. This signal is transmitted from BMRC (B/M Mode Processor & Real Time Controller) Assy.

C. Steerable CWD Receiving Beamformer Assembly (STCG) [OPTION]

1. V–I Converter : Converts the 32–channel reception signals to the current. The 32–channel signals, the half side of 64–channel output from the Pre–Amp on PRAG Assy are transmitted to this V–I Converter.

2. Cross Point SW : Consists of 32×24 switch group. The signals converted to the current are selected and transmitted to the +T/2 Delay Line or the –T/2 Delay Line.

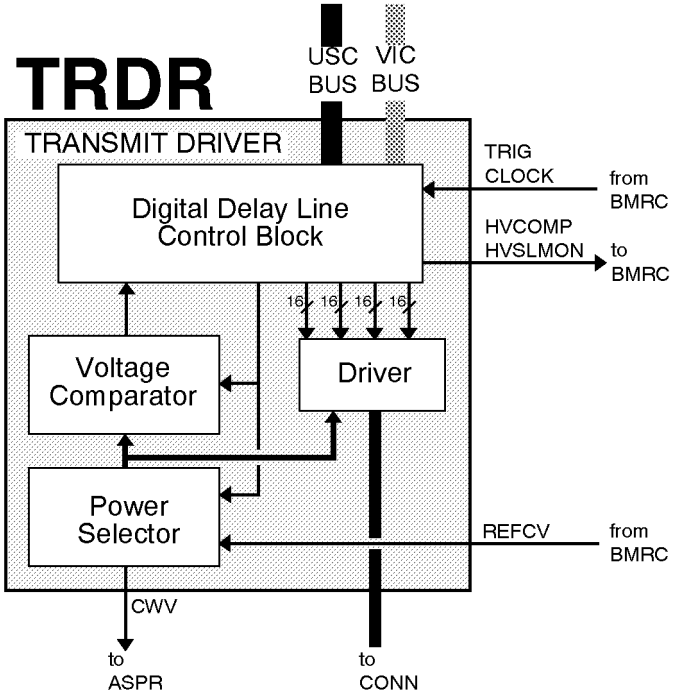
3. Delay Line : has two delay lines, the +T/2 side and –T/2 side. The current signals transmitted from the switch group are summed up at each delay line and each signals summed up are added.

4. V–I Converter : Converts the beamformed signal to the current and transmits it to the ASPR Assy.

5. Switch Controller : Controls the interface signals sent from the BMRC Assy.

1–3 TRANSMIT DRIVER ASSY

1–3–1 Transmit Driver Assy Block Diagram



TRANSMIT DRIVER ASSY BLOCK DIAGRAM
ILLUSTRATION 1–6

1–3–2 Transmit Driver Assy Overview

The Transmit Driver Assy drives transducer elements – a total of 64 simultaneous channels.

1–3–3 Transmit Driver Assy Block Diagram Explanation

The Transmit Driver Assy components perform the following functions :

1. Digital Delay Line Control Block : Controls the transmit delay pulse. This also transfers data between VIC bus and USC bus and controls the DRAMs.

2. Driver : Consists of 64–channel pulser driving the probes.

3. Voltage Comparator : Monitors the THV (voltage for transmit driver) and generates HVCOMP and HVSLMON. HVCOMP compares the input and output voltage of the Power Selector on the TRDR Assy and controls them. HVSLMON checks that the HVSLCT is send properly.

4. Power Selector : Consists of two blocks, power selector block and CW power supply block. The power selector block selects the HV power either HIV (high voltage) or LOV (Low voltage) depending on operation mode. The CW power supply block supplies the voltage for Steerable CW Doppler (LOV) and for Single CW Doppler (CWV).

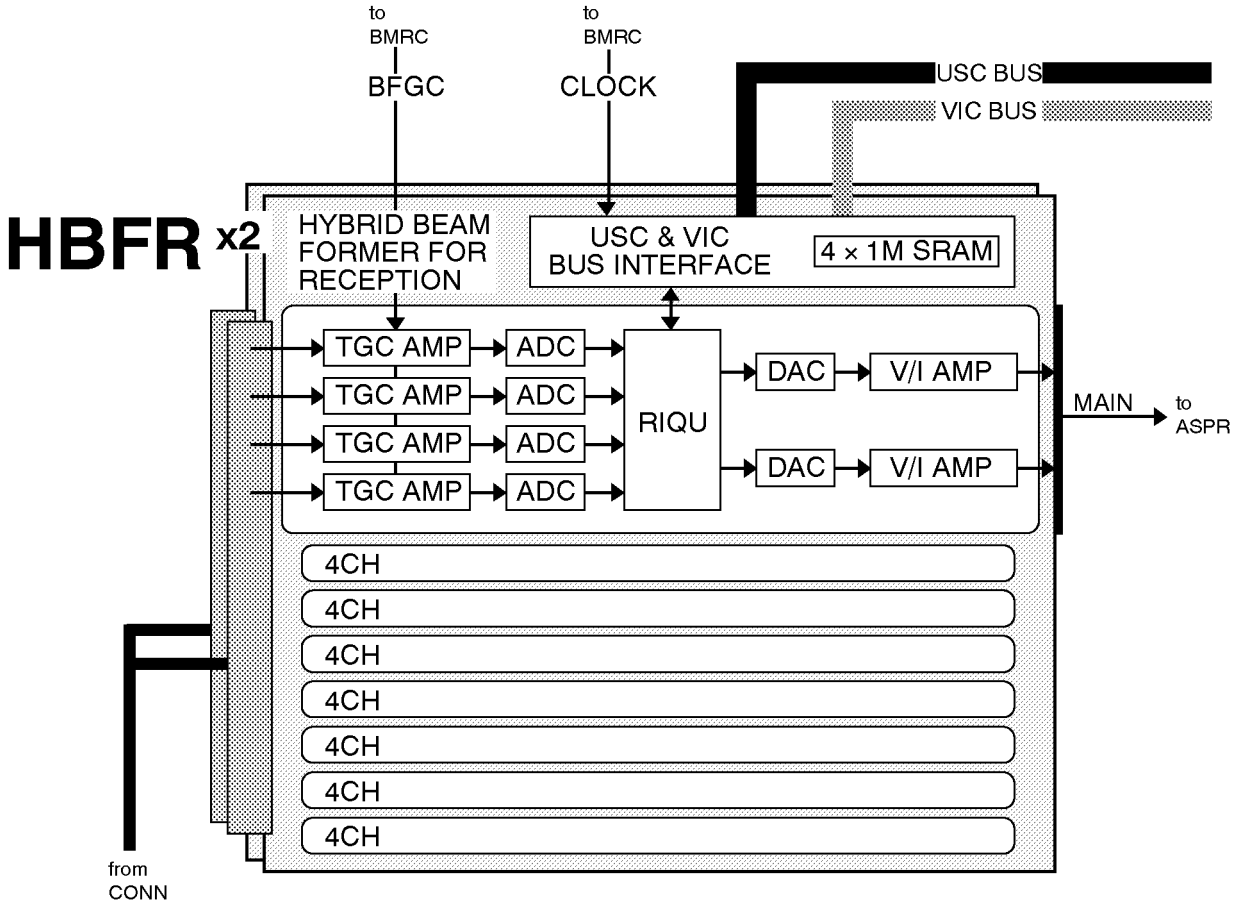
5. Signals :

    - REFCV : Controls the HV voltage. This signal is transmitted from BMRC (B/M Mode Processor & Real Time Controller) Assy.

    - CLOCK : Clock signal, 20MHz for transmitting signals.

1–4 HYBRID BEAM FORMER FOR RECEPTION (HBFR) ASSY

1–4–1 Hybrid Beam Former for Reception Assy Block Diagram



HYBRID BEAM FORMER FOR RECEPTION ASSY BLOCK DIAGRAM
ILLUSTRATION 1–7

1–4–2 Hybrid Beam Former for Reception Assy Overview

The two HBFR Assemblies drive transducer elements –a total of 64 simultaneous channels– receive echo signals via the Connector Assy. Each of the two HBFRs includes 32 channels used for receiving echo signals.

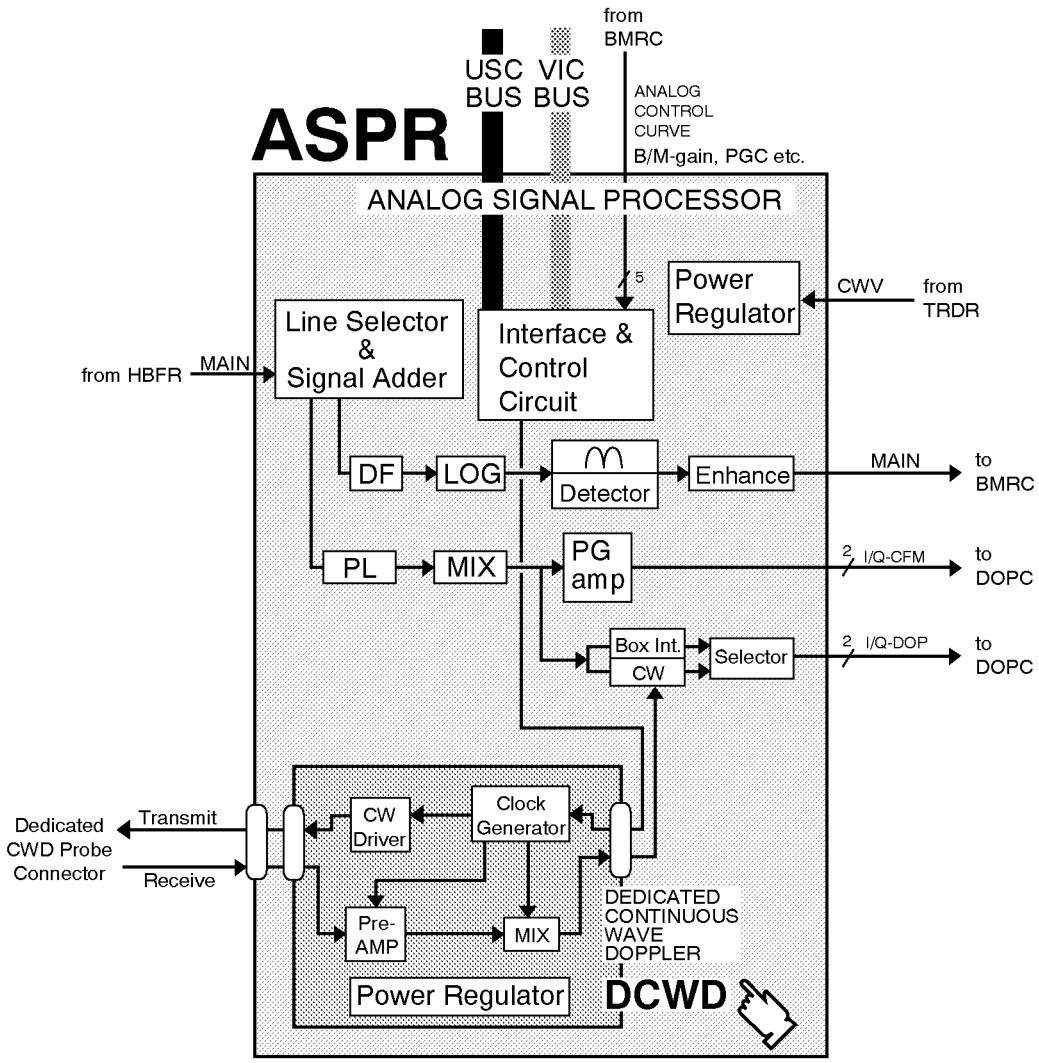
1–4–3 Hybrid Beam Former for Reception Assy Block Diagram Explanation

The Hybrid Beam Former for Reception Assy components perform the following functions :

1. Time Gain Controller Amplifier (TGC AMP) : Controls echo signals to correct time dependent attenuation.
2. Analog to Digital Converter (ADC) : Converts analog echo signals to digital signals for a ”RIQU” section.
3. RIQU (Receiving Beamformer ASIC) : Provides time delay for receiving 2-channel digital echo signal as a digital delay line. This includes the Continuous Dynamic Focusing (CDF) by controlling a phase of sampling clock for the ADC and DAC. RIQU also changes the number of echo signals received to allow image uniformity between near field and far field echo signals (Continuous Dynamic Aperture: CDA).
4. Digital to Analog Converter (DAC): Provides a reference voltage which varies depending upon the channel. This converts the digital delay line to analog signal.
5. V/I–Amp : Converts the analog signal converted by the DAC to current signal and sends current echo signal added with other echo signal to ASPR Assy.
6. Signals :
    - ECHO : Echo signals from the Connector Assy.
    - MAIN : Main echo signal is simultaneous echo signals.
    - USC BUS : Ultra Sonic Control BUS.
    - VIC BUS : Venus Intelligent CPU BUS.
    - BFGC : Beam Former Control signal for the TGC–AMP.
    - CLOCK : Clock signals, 26.6MHz for receiving echo signals.

1–5 ANALOG SIGNAL PROCESSOR (ASPR) ASSY

1–5–1 Analog Signal Processor Assy Block Diagram



ANALOG SIGNAL PROCESSOR ASSY BLOCK DIAGRAM
ILLUSTRATION 1–8

1–5–2 Analog Signal Processor Assy Overview

The Analog Signal Processor Assy processes echo signals by log compression and envelope detection. This assembly also processes echo signals to extract Doppler signals.

1–5–3 Analog Processor Assy Block Diagram Explanation

The Analog Processor Assy components perform the following functions :

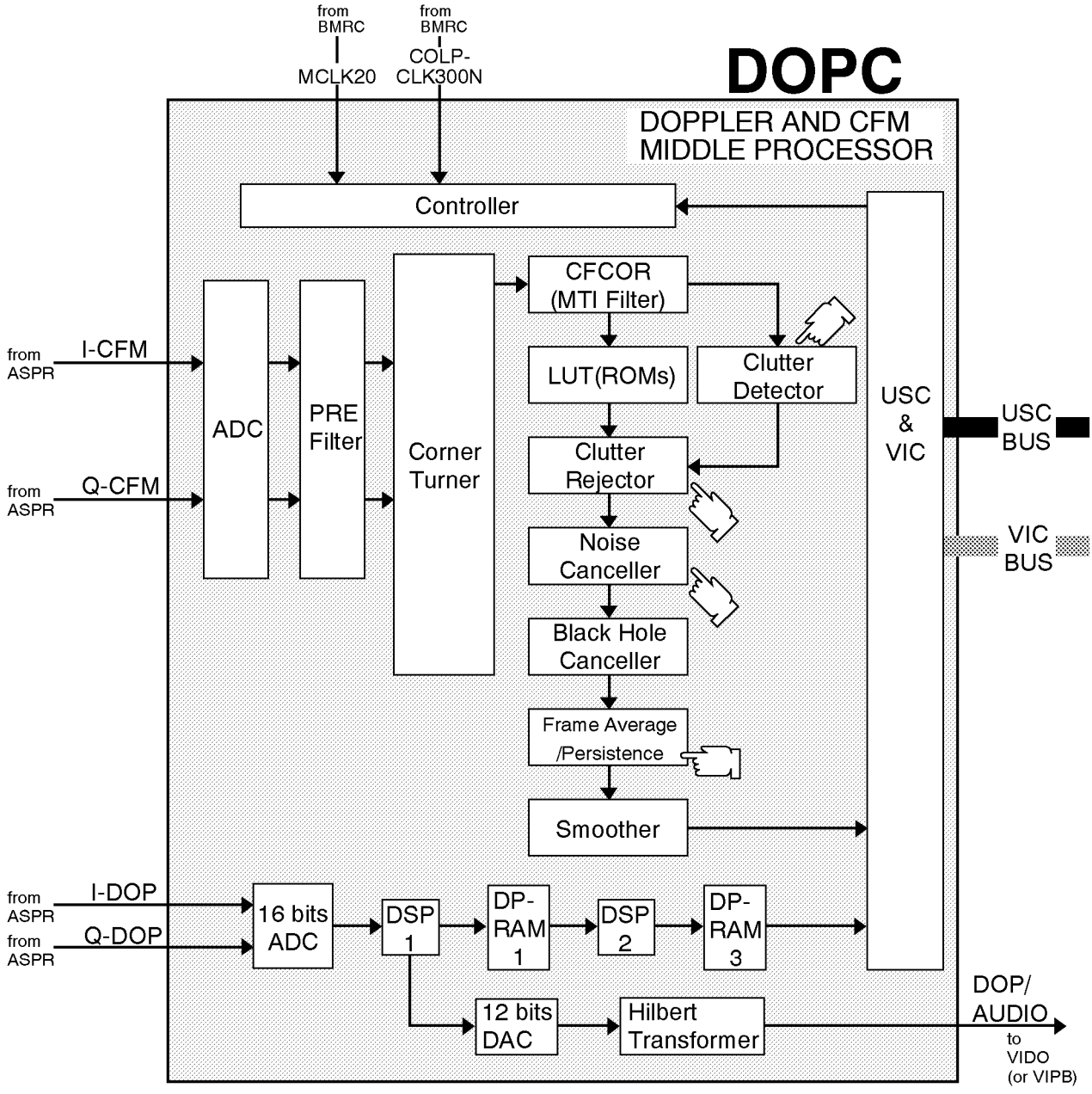
1. Interface and Control Circuit : Transfers data between the VIC and USC buses, and converts analog control curves sent from the BMRC Assy into control signals for the circuits within the ASPR Assy.
2. Line Selector and Signal Adder : Selects an input signal for each mode of operation (B, D, etc.), and converts signals sent from the HBFR Assemblies into voltage by adding current.
3. Dynamic Filter (DF) : Changes the center frequency. It is a band–pass filter .
4. Log Compressor (LOG) : Logarithmically compresses signals.
5. Detector : Detects the presence of an envelope.
6. Enhancer (Enhance) : Changes the frequency response by differentiation for edge enhancement.
7. Programmable Limiter (PL) : Limits strong echo to prevent saturation at the downstream stage. It can change the limit level only when in the Color Flow Mapping (CFM) mode.
8. Mixer (MIX) : Operates as a quadruple phase detector.
9. Box Car Integrator (Box Int) : Integrates signals within a specific range gate. It operates only when in PW Doppler mode.
10. Continuous Wave Doppler Filter (CW) : Selects one of the four type of filters. It is a band–pass filter which operates only when in Continuous Wave Doppler (CWD) mode.
11. Selector : Selects a signal processing path for each of the PW and CW Doppler modes.
12. Programmable Gain Amplifier (PG Amp) : Provides variable gain amplification during Color Flow Mapping (CFM) mode.
13. Dedicated Continuous Wave Doppler (DCWD) block [Option]: This ultrasound transmission/reception circuit, dedicated to CWD probe, is further divided into the following :
    - Clock Generator : Generates a transmission driver exciting pulse, demodulation carrier and test signal.
    - CW Driver : Drives continuous wave transmissions.
    - Pre–amplifier (Pre AMP) : Amplifies reception of CWD signals.
    - Mixer (MIX) : Is a quadruple phase detector.
14. Power Regulator : Generates regulated DC voltages for operational amplifier, LOG amplifier, and mixer.

1–6 DOPPLER AND CFM MIDDLE PROCESSOR (DOPC) ASSY

1–6–1 Doppler and CFM Middle Processor Assy Block Diagram

Note

This board is only used for Color Monitor system.



DOPPLER AND CFM MIDDLE PROCESSOR ASSY BLOCK DIAGRAM
ILLUSTRATION 1–9

1–6–2 Doppler and CFM Middle Processor Assy Overview

The Doppler and CFM Middle Processor (DOPC) Assy is used only for the color monitor system. The Doppler and CFM Middle Processor (DOPC) Assy consists of two blocks, doppler processing block and CFM processing block. The CFM processing block receives I/Q–CFM signals from the Analog Signal Processor (ASPR) Assy for calculating mean velocity, variance, and power of blood flow. The mean velocity, variance, and power of blood flow are displayed on the CRT monitor screen using the Color Flow Mapping (CFM). The doppler block performs Fast Fourrier Transformation (FFT) and Logarithmical (LOG) compression to display its spectrum.

1–6–3 Doppler and CFM Middle Processor Assy Block Diagram Explanation

The Doppler and CFM Processor Assy components perform the following functions :

1. USC and VIC Bus Interface (USC & VIC BUS) : Interfaces controls input and output of data and parameters to and from USC and VIC buses. The registers in this block store parameters received from the CPU via VIC bus, and parameters received via the USC bus. These parameters are used for signal processing.

2. Controller : Supplies necessary parameters, which are stored in the register of the USC and VIC Bus Interface, to process I and Q signals for each block in this board. The controller also supplies the ”sequence” to process one echo line.

3. Analog to Digital Converter (ADC) : Converts the I–CFM and Q–CFM signals supplied from the Analog Signal Processor (ASPR) Assy from analog to digital signals.

4. Pre–filter (PRE Filter) : Receives echo signals from the Analog to Digital Converter (ADC), and processes each echo signal in the direction of (along the axis of) depth using ”moving–average” and ”down sampling” for an improved signal–to–noise ratio.

5. Corner–Turner : Buffers echo signals from the pre–filter. The corner–turner consists of a 2–bank (banks A and B) buffer. While output from the pre–filter is being written into bank A, data in bank B is read by the Color Flow Correlator(CFCOR). On the contrary, while output from the pre–filter block is being written into bank B, data is read from bank A.

6 Color Flow Correlator (CFCOR) : Reads echo signal from the Corner–turner. I/Q data at each depth of echo signal is processed by MTI filtering, and then by complex auto–correlation and power calculation.

7. Look–up Table (LUT(ROMs)) : Receives echo signals from the Color Flow Correlator and processes the echo signals to find the mean velocity and variance of blood flow at each depth based on the results of the complex auto–correlation and power calculation received from the Color Flow Correlator. Also, these data are accepted or rejected depending on the threshold power value.

8. Clutter Detector : Distinguishes clutter information from the outputs of CFCOR block and sends them to Clutter Rejector block.

9. Clutter Rejector : Receives outputs from the Look–up Table block and the Clutter Detector. The clutter noise is removed from signals depending on the information from the Clutter Detector block.

10. Noise Canceller : Receives outputs from the Clutter Rejector block and stores data in a previous acoustic frame. The correlation between the data in a new frame and the data in a previous frame is implemented. When its result indicates a “low–correlation”, the data sent to the next block is rejected. The redundant data is rejected as well depending on the given threshold of power value.

1–6–3 Doppler and CFM Middle Processor Assy Block Diagram Explanation (Continued)

11. Black Hole Canceller : Processes echo signals received from the Look–up Table based on the mean velocity or power at the same depth as the three adjacent echo signals. This block then process the echo signals to ensure no ”Black Hole” image appears on the CRT monitor during B–mode Color Flow Mapping.

12. Frame Averaging/Persistence : Receives signals from the Black Hole Canceller block and stores data in a previous acoustic frame. Data at the same depth and the same acoustic line is averaged. Otherwise, this block compares data between new and old frames at the same depth and acoustic line, and either the data in a new frame or the data in an old frame is captured or persisted.

13. Smoother : The mean velocity, variance, and power values are smoothed in the direction of (along the axis of) depth.

14. 16–bit Analog to Digital Converter (16 bits ADC) for D–mode : Converts Pulse Doppler and Continuous Wave Doppler analog signals (I and Q signal) into 16–bit digital signals.

15. Digital Signal Processor 1 (DSP1) : Performs Wall filter processing, I/Q balance correction, impulse noise reduction, segmented Doppler control for Pulse Doppler and Continuous Wave Doppler. The DSP also performs gain control for Doppler signal, and decimation filter processing for Continuous Wave Doppler.

16. 12–bit Digital to Analog Converter (12–bit DAC) for audio signal : Converts digital signals into analog signals for audio output of Doppler signals (I/Q). This block also includes an anti–aliasing filter.

17. Dual Port RAM 1 (DPRAM1) : Transfers signals from Digital Processor 1 to Digital Signal Processor 2.

18. Hilbert Transformer : Generates a forward/reverse audio signal from Doppler signals (I, Q) using a wide–band (90 degree) phase shifter.

19. Digital Signal Processor 2 (DSP2) : Process 128–point FFT of Doppler signals, and signals for LOG compression, real-time auto–trace, base line shift, and spectrum invert.

20. Dual Port RAM 3 (DPRAM3) : Transfers FFT spectrum data (7 bits) from the Digital Signal Processor 2 to USC bus.

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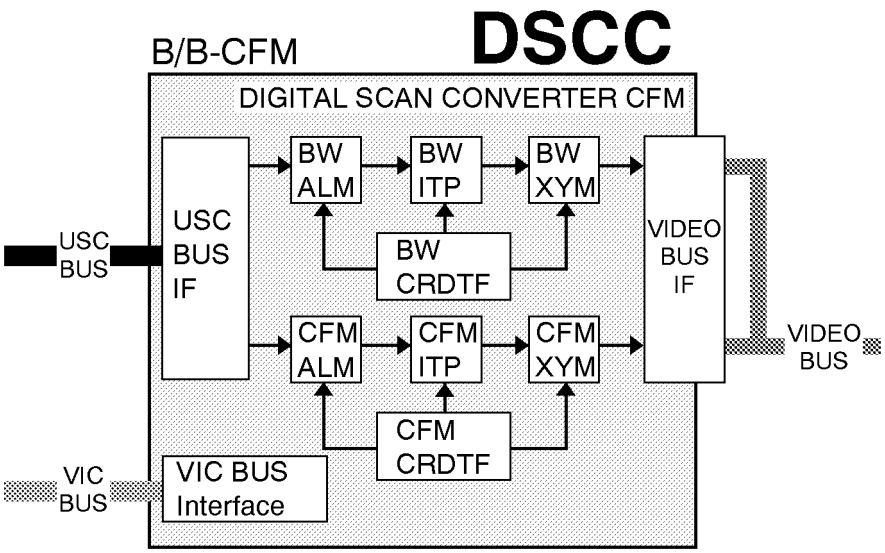
1–7 DIGITAL SCAN CONVERTER CFM (DSCC) ASSY

1–7–1 Digital Scan Converter CFM Assy Block Diagram

Note

This board is only used for Color Monitor system.



DIGITAL SCAN CONVERTER CFM ASSY BLOCK DIAGRAM
ILLUSTRATION 1–10

1–7–2 Digital Scan Converter CFM Assy Overview

The Digital Scan Converter CFM (DSCC) Assy is used only for the color monitor system. The DSCC Assy receives B–mode image data in black and white from the B/M Mode Processor and Real Time Controller Assy (BMRC), and from the CINE block of the Time Line Memory Processor with CINE Assy (TLMC), and receiving B–mode image data in color from the Doppler and CFM Middle Processor Assy (DOPC). This board converts B–mode image data, both black and white, and color, into a standard television scan format.

1–7–3 Digital Scan Converter CFM Assy Block Diagram Explanation

The Digital Scan Converter CFM Assy components perform the following functions :

1. USC Bus Interface (USC BUS IF) : Receives image data, latches it and sends it to the Black and White Acoustic Line Memory (BW ALM) or the Color Flow Mapping Acoustic Line Memory (CFM ALM). Control signals are sent from the BMRC Assy and stored in a register.

2. Black and White Acoustic Line Memory (BW ALM) : Stores black and white Image data. This is a Scan Line Number – Depth coordinate memory ((256 or 128x128)* x 1,024 x 6–bit) made up of 3 pages each of which contains 2 banks each with (2 or 1)* plane(s). One page has 2 banks and one bank has (2 or 1)* plane(s). One acoustic scan frame will be written in each of the 2 planes in the 4 banks of a page. One of the 3 pages writes data in this memory, then another page reads data from the memory. The page will be renewed by the new acoustic scan frame and new TV scan frame.

   * : 1–plane mode: 256, 2–plane mode: 128x128

3. Black and White Data Interpolator (BW ITP) : performs interpolation between 2 adjacent points of data from the Black and White Acoustic Line Memory (BW ALM).

4. Black and White X–Y Memory (BW XYM) : stores acoustic scan data ((512+512)x512x7 bit). The acoustic scan data are read using TV scan format. The VIC bus is able to read and write data between the BW X–Y Memory.

5. Black and White Coordinate Transformer (BW CRDTF) : Generates X–Y coordinate addresses which are used to write image data in the Black and White X–Y Memory (BW XYM). It also generates Scan Line No. – Depth Coordinate Read Addresses which are used to read data from the Black and White Acoustic Line Memory (BW ALM). The fractional part of Scan Line No. – Read Address is sent to the Black and White Interpolator (BW ITP). The fractional part performs 2 point interpolation.

6. Color Flow Mapping Acoustic Line Memory (CFM ALM) : Performs the same function as the Black and White Acoustic Line Memory (BW ALM) for color mode. The memory word width is ((256 or 128x128)* x 1,024 x 8 bit), 6 bits for Velocity, and 2 bits for Turbulence (5 bits for Velocity and 3 bits for Turbulence in 1–plane mode).

7. Color Flow Mapping Data Interpolator (CFM ITP) : Performs interpolation between 2 adjacent points of data from the Color Flow Mapping Acoustic Line Memory (CFM ALM).

8. Color Flow Mapping X–Y Memory (CFM XYM) : Performs the same function as the Black and White X–Y Memory (BW XYM) for color mode. Memory word width is (512 x 512 x 8 bit), 6 bits for Velocity, and 2 bits for Turbulence (5 bits for Velocity and 3 bits for Turbulence in 1–plane mode).

9. Color Flow Mapping Coordinate Transformer (CFM CRDTF) : Performs the same function as the Black and White Coordinate Transformer for color mode.

10. VIC Bus Interface : Interfaces the input and output of data and parameters to and from VIC bus.

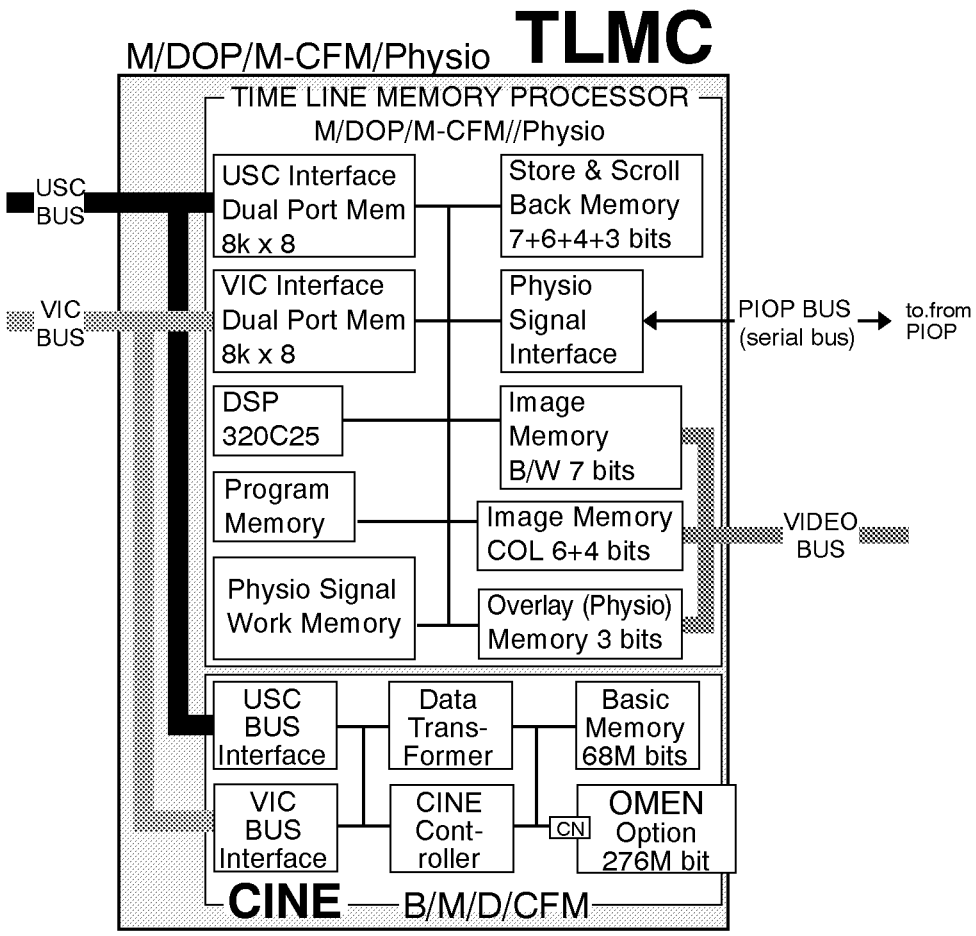
11.. VIDEO Bus Interface : Interfaces the input of video synchronous signals and area signals, and the output of B–mode B/W and CFM image data.

1–8 TIME LINE MEMORY PROCESSOR WITH CINE (TLMC) ASSY

1–8–1 Time Line Memory Processor with CINE Assy Block Diagram

Note

This board is only used for Color Monitor system.



TIME LINE MEMORY PROCESSOR WITH CINE ASSY BLOCK DIAGRAM
ILLUSTRATION 1–11

1–8–2 Time Line Memory Processor with CINE Assy Overview

The Time Line Memory Processor with Cine (TLMC) Assy is used only for the color monitor system. The TLMC Assy receives the following image data : M–mode, M–CFM, Doppler–mode, Electro Cardiogram (ECG), Phono Cardiogram (PCG), and Heart Rate. The TLMC Assy interpolates and saves these image data in the memory of the Time Line Memory Processor block (TLMP) and the CINE block. The image data is then sent to the Video Bus, and to the Digital Scan Converter CFM Assy (DSCC). It is possible to install additional CINE memory chips.

1–8–3 Time Line Memory Processor with CINE Assy Block Diagram Explanation

The Time Line Memory Processor with CINE Assy components perform the following functions :

A. TLMP

1. USC Interface Dual Port Memory (8k x 8), VIC Interface Dual Port Memory (Mem 8k x 8) : Transfer the input and output of data and parameters to and from the USC and VIC buses.
2. Digital Signal Processor (DSP 320C25) : Interpolates image data from the USC Interface, manages the frame memory, controls communication between the TLMP block and the PIOP Assy, and processes commands received from the VIC Bus.
3. Program Memory : Stores DSP software down–loaded from the CPU via the VIC Bus.
4. Physiological Signal and Working Memory : Saves the physiological signal. The Working Memory has a interpolation table for the DSP process.
5. Store and Scroll Back Memory : Saves image data for "Image Store and Scroll Back"– mode, and for CINE–mode. This memory has 20–bit plane (7:B/W, 6+4:Color, 3:Physiological and Auto–trace).
6. Physiological Signal Interface : Acts as an interface between the PIOP Assy using a serial communication bus.
7. Image Memory for Black and White (B/W) : Saves image data for M–mode and D–mode. The image data are sent to and received from the Store and Scroll Back Memory. The image data are sent through the Video Bus.
8. Image Memory Color (COL) : Saves image data for CFM–mode. The image data are sent to and received from the Store and Scroll Back Memory. The image data are sent through the Video Bus.
9. Overlay (Physiological) Memory : Saves image data for Physiological signals and Auto–trace for Doppler–mode. The image data are sent to and received from the Store and Scroll Back Memory. The data are sent through the Video Bus.

B. CINE memory

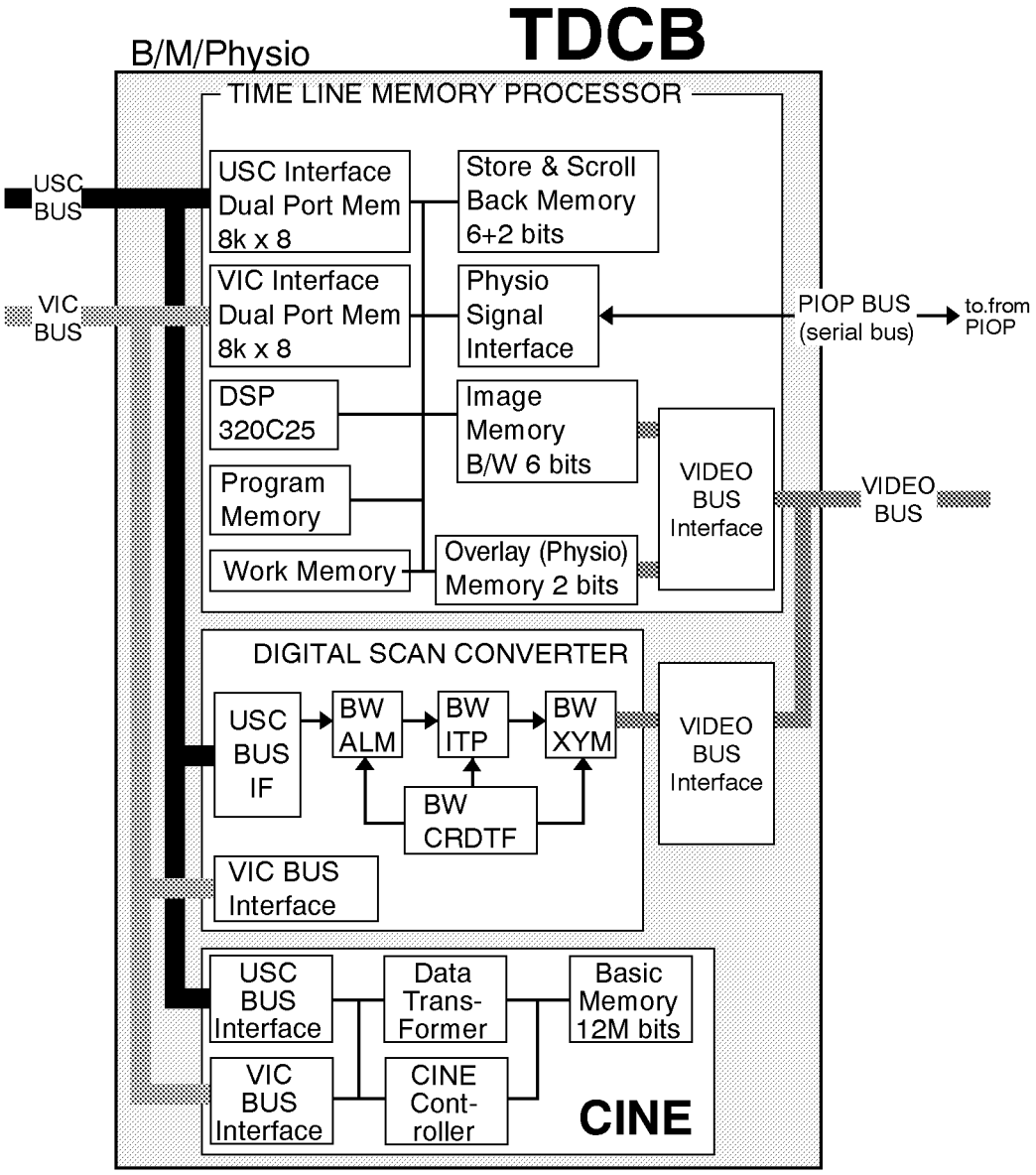
10. USC Bus and VIC Bus Interface : Transfer the input and output of data and parameters to and from the USC and VIC buses.
11. CINE Controller : Controls Data Transformer, Basic Memory, and Optional Memory (OMEM).
12. Data Transformer : Transforms the following signals: (1) USC serial data into parallel data which it sends to the Basic Memory block and vise versa, (2) 1 word data (0–15 bit) from VIC Bus data into 3 word data (0–15, 16–31, and 32–35) for the Basic Memory, and the reverse (3 word data of the Basic Memory into 1 word data for the VIC Bus).
13. Basic Memory : Stores a maximum of 32 frames (total 4,096 scan lines =128 scan line x 32 frames).
14. Optional Memory (OMEM) : Stores a maximum of 128 frames (total 16,384 scan lines =128 scan line x 128 frames).

1–9 TIME LINE MEMORY PROCESSOR AND DIGITAL SCAN CONVERTER WITH CINE (TDCB) ASSY

1–9–1 Time Line Memory Processor and Digital Scan Converter with CINE Assy Block Diagram

Note

This board is only used for B/W Monitor system.



TIME LINE MEMORY PROCESSOR AND DIGITAL SCAN CONVERTER WITH CINE ASSY BLOCK DIAGRAM
ILLUSTRATION 1–12

1–9–2 Time Line Memory Processor and Digital Scan Converter with CINE Assy Overview

The Time Line Memory Processor and Digital Scan Converter with Cine (TDCB) Assy is used only for the B/W monitor system. The TDCB Assy consists of three blocks and the function of each block is as follows:

TLMP (Time Line Memory Processor) : Receives the following image data : M–mode, Electro Cardiogram (ECG), Phono Cardiogram (PCG), and Heart Rate. The TLMP interpolates and saves these image data in the memory of the Time Line Memory Processor block (TLMP). The image data is then sent to the Video Bus.

DSC (Digital Scan Converter) : Receives B–mode image data in black and white from the B/M Mode Processor and Real Time Controller Assy (BMRC), and from the CINE block of the TDCB Assy. This converts B–mode image data in black and white into a standard television scan format.

CINE : Stores B–mode image data sent from BMRC Assy in the basic memory. While the displayed image is frozen, this sends the stored B–mode image data to DSC block of the TDCB Assy.

1–9–3 Time Line Memory Processor and Digital Scan Converter with CINE Assy Block Diagram Explanation

The Time Line Memory Processor and Digital Scan Converter with CINE Assy (TDCB) components perform the following functions :

A. TLMP

1. USC Interface Dual Port Memory (8k x 8), VIC Interface Dual Port Memory (Mem 8k x 8) : transfer the input and output of data and parameters to and from the USC and VIC buses.
2. Digital Signal Processor (DSP 320C25) : Interpolates image data from the USC Interface, manages the frame memory, controls communication between the TLMP block and the PIOP Assy, and processes commands received from the VIC Bus.
3. Program Memory : Stores DSP software down–loaded from the CPU via the VIC Bus.
4. Working Memory : Has a interpolation table for the DSP process.
5. Store & Scroll Back Memory : Saves image data for "Scroll Back"– mode. This memory has 8–bit plane (6:B/W and 2:Physiological).
6. Physiological Signal Interface : Acts as an interface between the PIOP Assy using a serial communication bus.
7. Image Memory for Black and White (B/W) : Saves image data for M–mode and D–mode. The image data are sent to and received from the Store & Scroll Back Memory. The image data are sent through the Video Bus.
8. Overlay (Physiological) Memory : Saves image data for Physiological signals. The image data is sent to and received from the Store & Scroll Back Memory. The data is sent through the Video Bus.
9. VIDEO Bus Interface : Interfaces the input of video synchronous signals and area signals, and the output of M–mode B/W image data and overlay data.

1–9–3 Time Line Memory Processor and Digital Scan Converter with CINE Assy Block Diagram Explanation (Continued)

B. DSC

10. USC Bus Interface (USC BUS IF) : Receives image data, latches it and sends it to the Black and White Acoustic Line Memory (BW ALM). Control signals are sent from the BMRC Assy and stored in a register.

11. Black and White Acoustic Line Memory (BW ALM) : Stores black and white Image data. This is a Scan Line Number – Depth coordinate memory ((256 or 128x128)* x 1,024 x 6–bit) made up of 3 pages each of which contains 2 banks each with (2 or 1)* plane(s). One page has 2 banks and one bank has (2 or 1)* plane(s). One acoustic scan frame will be written in each of the 2 planes in the 4 banks of a page. One of the 3 pages writes data in this memory, then another page reads data from the memory. The page will be renewed by the new acoustic scan frame and new TV scan frame.

    * : 1–plane mode: 256, 2–plane mode: 128x128

12. Black and White Data Interpolator (BW ITP) : Performs interpolation between 2 adjacent points of data from the Black and White Acoustic Line Memory (BW ALM).

13. Black and White X–Y Memory (BW XYM) : Stores acoustic scan data ((512+512) x 512 x 7–bit). The acoustic scan data are read using TV scan format. The VIC bus is able to read and write data between the BW X–Y Memory.

14. Black and White Coordinate Transformer (BW CRDTF) : Generates X–Y coordinate addresses which are used to write image data in the Black and White X–Y Memory (BW XYM). It also generates Scan Line No. – Depth Coordinate Read Addresses which are used to read data from the Black and White Acoustic Line Memory (BW ALM). The fractional part of Scan Line No. – Depth Coordinate Read Address is sent to the Black and White Interpolator (BW ITP). The fractional part performs 2 point interpolation.

15. VIC Bus Interface : Interfaces the input and output of data and parameters to and from VIC bus.

16. VIDEO Bus Interface : Interfaces the input of video synchronous signals and area signals, and the output of B–mode B/W image data.

C. CINE memory

17. USC Bus and VIC Bus Interface : Transfers the input and output of data and parameters to and from the USC and VIC buses.

18. CINE Controller : Controls Data Transformer and Basic Memory.

19. Data Transformer : Transforms the following signals: (1) USC serial data into parallel data which it sends to the Basic Memory block and vise versa, (2) 1 word data (0–15 bit) from VIC Bus data into 2 word data (0–15 and 16–23) for the Basic Memory, and the reverse (2 word data of the Basic Memory into 1 word data for the VIC Bus).

20. Basic Memory : Stores a maximum of 16 frames (total 4,096 scan lines =128 scan line x 16 frames).

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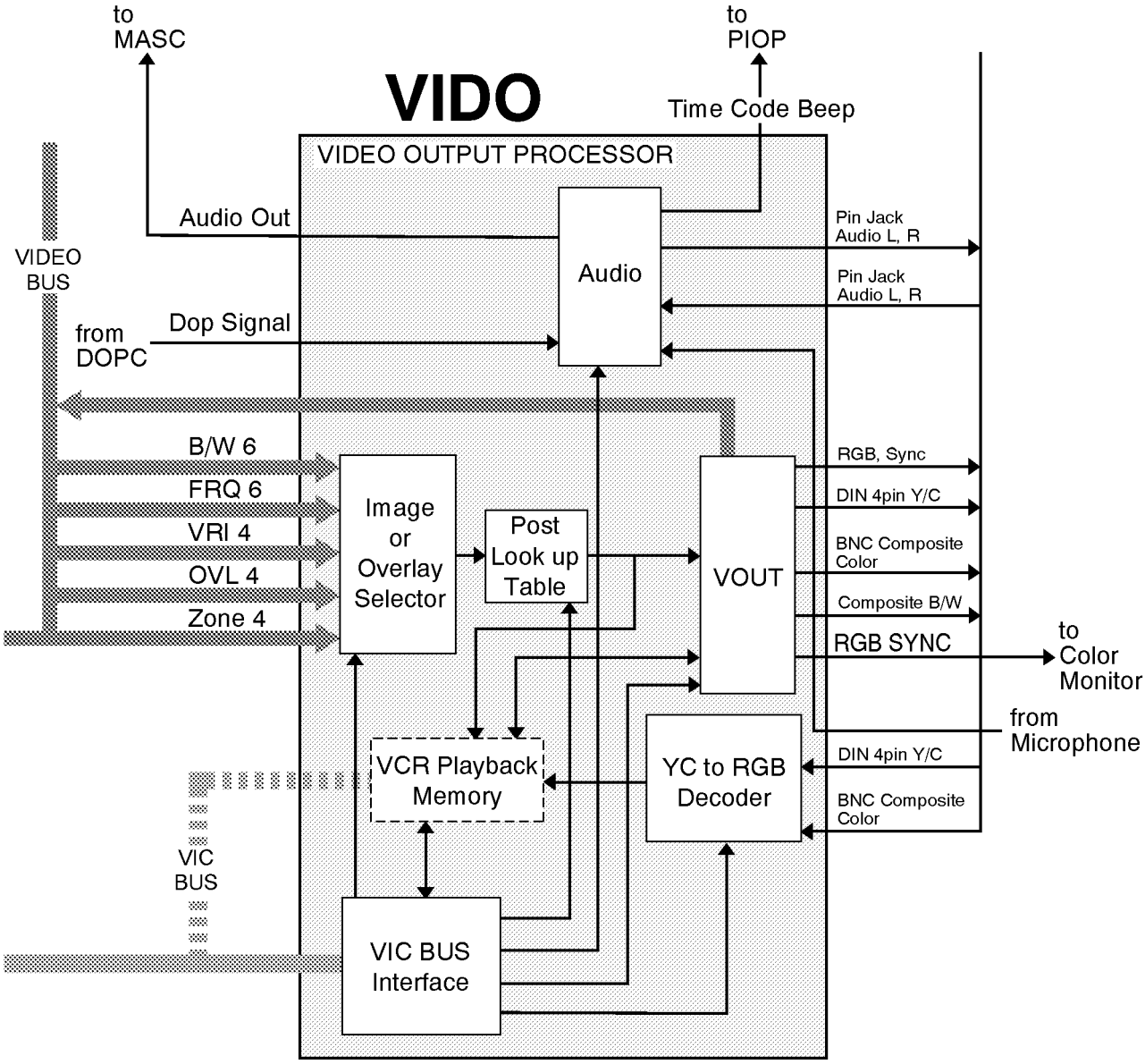
1–10 VIDEO OUTPUT PROCESSOR (VIDO) ASSY

1–10–1 Video Output Processor Assy Block Diagram

Note

This board is only used for Color Monitor system.



VIDEO OUTPUT PROCESSOR (VIDO) ASSY BLOCK DIAGRAM
ILLUSTRATION 1–13

1–10–2 Video Output Processor Assy Overview

The Video Output Processor (VIDO) Assy is used only for the color monitor system. The VIDO Assy does not include the VCR Playback Memory. The optional VIPB Assy has the VCR Playback Memory.
The VIDO Assy receives B/M–mode image signals from the Digital Scan Converter CFM Assy (DSCC) and the Time Line Memory Processor Assy (TLMC). This board then converts these signals into RGB signals for CRT monitor and peripheral equipment. This board also has an audio control function.

1–10–3 Video Output Processor Assy Block Diagram Explanation

The Video Output and Playback Processor Assy components perform the following functions :

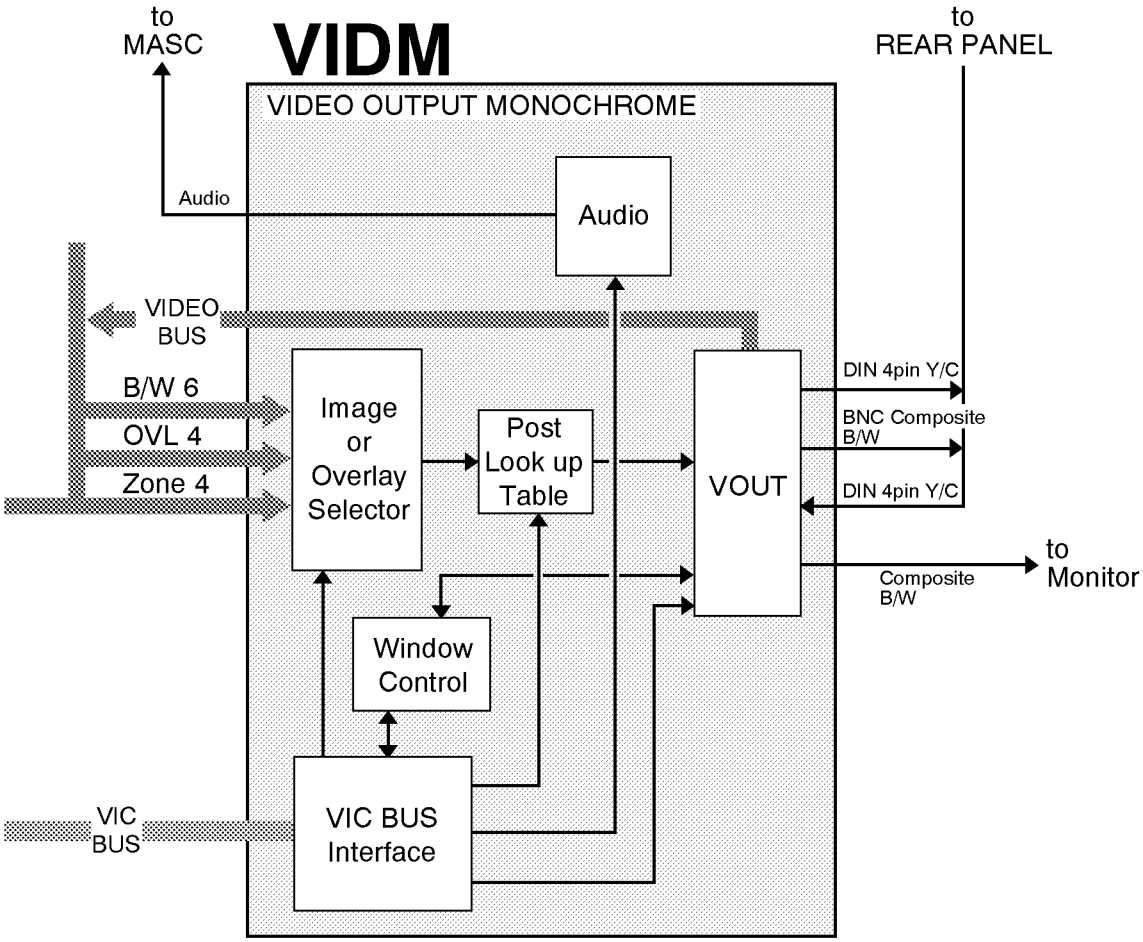
1. Audio : The audio block includes a selector, a volume and equalizer, and a beep generator which perform the following :
    a. Selector : Selects one of three signals. The three signals are Doppler signal from the DOPC Assy, VCR Audio signal via the rear panel, and Audio signal from microphone on the CRT monitor.
    b. Volume and Equalizer : adjusts volume level and tone of signals coming from the Selector according to control signal coming from the MPU Assy. The audio signals are sent to the Audio power amplifier on the MPU Assy –for the speakers on the CRT monitor– or optional VCR.
    c. Beep Generator : Generates the BEEP sound for error alarming and physiological signals.
2. Image or Overlay Selector : Selects one of B–mode/M–mode/Doppler/Overlay signals sent from the Digital Scan Converter CFM (DSCC) Assy (B–mode), the Time Line Memory Processor Assy (M–mode, Physiological signal), or the MPU Assy (hospital name, etc.).
3. Post Look Up Table : Converts the image signals or the overlay signals coming from the Image or Overlay Selector into a desired brightness and chromaticity data.
4. YC to RGB Decoder : This block includes an Analog to Digital Converter (ADC) and an RGB Decoder which perform the following :
    a. ADC : Receives analog YC signals or analog Composite signals from optional VCR, and converts them into digital signals.
    b. RGB Decoder : Converts the digital YC signals and the digital Composite signals coming from the ADC into digital RGB signals.
5. VCR Playback Memory : Stores either the Live image, or the VCR image and sends the image to the Video Out. This part is not included in the VIDO Assy.
6. Video Out (VOUT) : The Video Out block includes an Output Selector, a Digital to Analog Converter (DAC), an RGB to YC encoder, and an Internal Clock Generator which perform the following :
    - Output Selector : Selects either the Live image coming from the Post Look Up Table via the DAC, the VCR image coming from the VCR Playback Memory via the DAC, or the RGB Sync signals coming from the rear panel, and sends the image signals to the CRT monitor or some peripheral equipment.
    - DAC, and RGB to YC Encoder : Converts digital signals coming from the Post Look Up Table or the VCR Playback Memory into RGB Sync signals. The encoder converts signals coming from the Post Look Up Table or the VCR Playback Memory into YC analog signals and Composite signals and sends the signals to VCR (YC or Composite signals) and Printer (Composite signals).
    - Internal Clock Generator : Generates HV (Horizontal, Vertical) Sync signals, Dot Clocks and Field signals.
7. VIC Bus Interface : Interfaces the input and output of data and parameters to and from the VIC bus.

1–11 VIDEO OUTPUT MONOCHROME (VIDM) ASSY

1–11–1 Video Output Monochrome Assy Block Diagram

Note

This board is only used for B/W Monitor system.



VIDEO OUTPUT MONOCHROME (VIDM) ASSY BLOCK DIAGRAM
ILLUSTRATION 1–14

1–11–2 Video Output Monochrome Assy Overview

The Video Output Monochrome (VIDM) Assy is used only for the B/W monitor system. The VIDM Assy receives B/M–mode image signals from the Time Line Memory Processor and Digital Scan Converter with Cine Assy (TDCB). This board then converts these signals into B/W composite signals for CRT monitor and peripheral equipment. This board generates a beep sound.

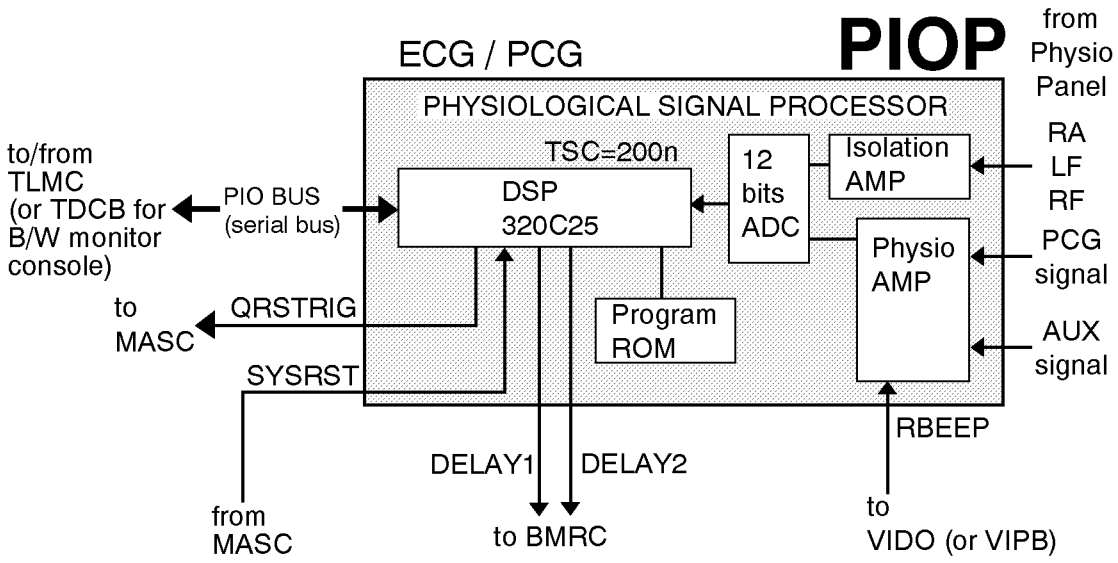
1–11–3 Video Output Monochrome Assy Block Diagram Explanation

The Video Output Monochrome Assy components perform the following functions :

1. Audio : Generates the BEEP sound for error alarming.
2. Image or Overlay Selector : Selects one of B–mode/M–mode/Doppler/Overlay signals sent from the Time Line Memory Processor and Digital Scan Converter with Cine Assy (B–mode, M–mode, Physiological signal) or the MPU Assy (hospital name, etc.).
3. Post Look Up Table : Converts the image signals or the overlay signals coming from the Image or Overlay Selector into a desired brightness.
4. Window Control : Controls the display area on the monitor.
5. Video Out (VOUT) : Includes an Output Selector, a Digital to Analog Converter (DAC), and an Internal Clock Generator which perform the following :
    - Output Selector : Selects either the Live image coming from the Post Look Up Table via the DAC or the VCR image coming from the VCR, and sends the image signals to the CRT monitor or some peripheral equipment.
    - DAC : Converts digital signals coming from the Post Look Up Table and sends the signals to VCR (YC or Composite signals) and Printer (Composite signals).
    - Internal Clock Generator : Generates HV (Horizontal, Vertical) Sync signals, Dot Clocks and Field signals.
6. VIC Bus Interface : Interfaces the input and output of data and parameters to and from the VIC bus.

1–12 PHYSIOLOGICAL SIGNAL PROCESSOR (PIOP) ASSY

1–12–1 Physiological Signal Processor Assy Block Diagram



PHYSIOLOGICAL SIGNAL PROCESSOR ASSY BLOCK DIAGRAM
ILLUSTRATION 1–15

Note

The PIOP Assy is changed with the PIOP2 Assy. The PIOP2 Assy has the reserved function for indicating the pulse waveform. This function is not available currently for the LOGIQ™ 400.

1–12–2 Physiological Signal Processor Assy Overview

The Physiological Signal Processor Assy amplifies a physiological signal such as an ECG, PCG, or AUX from the Physiological panel or an RBEEP signal from the Video Output Processor (VIDO) Assy, and converts these signals from analog to digital. Thereafter, the Physiological Signal Processor Assy filtrates the signals and performs a digital signal processing to detect such signals as the ECG QRS trigger signal. The Physiological Signal Processor Assy operates as a slave to the Time Line Memory Processor (TLMC) Assy. After digital signal processing, the physiological signal and RBEEP signal are transferred through the serial interface (over PIOP bus). The detected ECG QRS Trigger* signal is delivered to the MPU Assy and ECG delay trigger signals (DELAY1* and DELAY2*) are provided to B/M Mode Processor and Real Time Controller (BMRC) Assy.

1–12–3 Physiological Signal Processor Assy Block Diagram Explanation

1. Isolation Amplifier (Isolation AMP) : Amplifies ECG signals (RA, LF, RF) from the physiological panel which includes amplification at at the next stage.

2. Physiological Amplifier (Physio AMP) : Amplifies ECG signals (PCGSIG) from the physiological panel and buffers AUX SIG signals (AUXSIG) and RBEEP signals.

3. 12–bit Analog to Digital Converter (12–bit ADC) : Multiplexes and performs 12–bit analog to digital conversion of output signals (ECG–M, PCG–M, AUX–M and TEST–M) from the isolation amplifier and physiological amplifier.

4. Program ROM : Stores programs for the Digital signal Processor (DSP), 1 Mbits (16 bits * 64k).

5. Digital Signal Processor (DSP 320C25) : Operates in cooperation with a timer to control the peripheral circuits of the Physiological Signal Processor Assy to process signals from the 12–bit Analog to Digital Converter and provide QRSTRIG*, DELAY1* and DELAY2* trigger signals. Parameters necessary for other signal processing are transferred by serial communication (over PIOP bus) with the Time Line Memory Processor Assy.

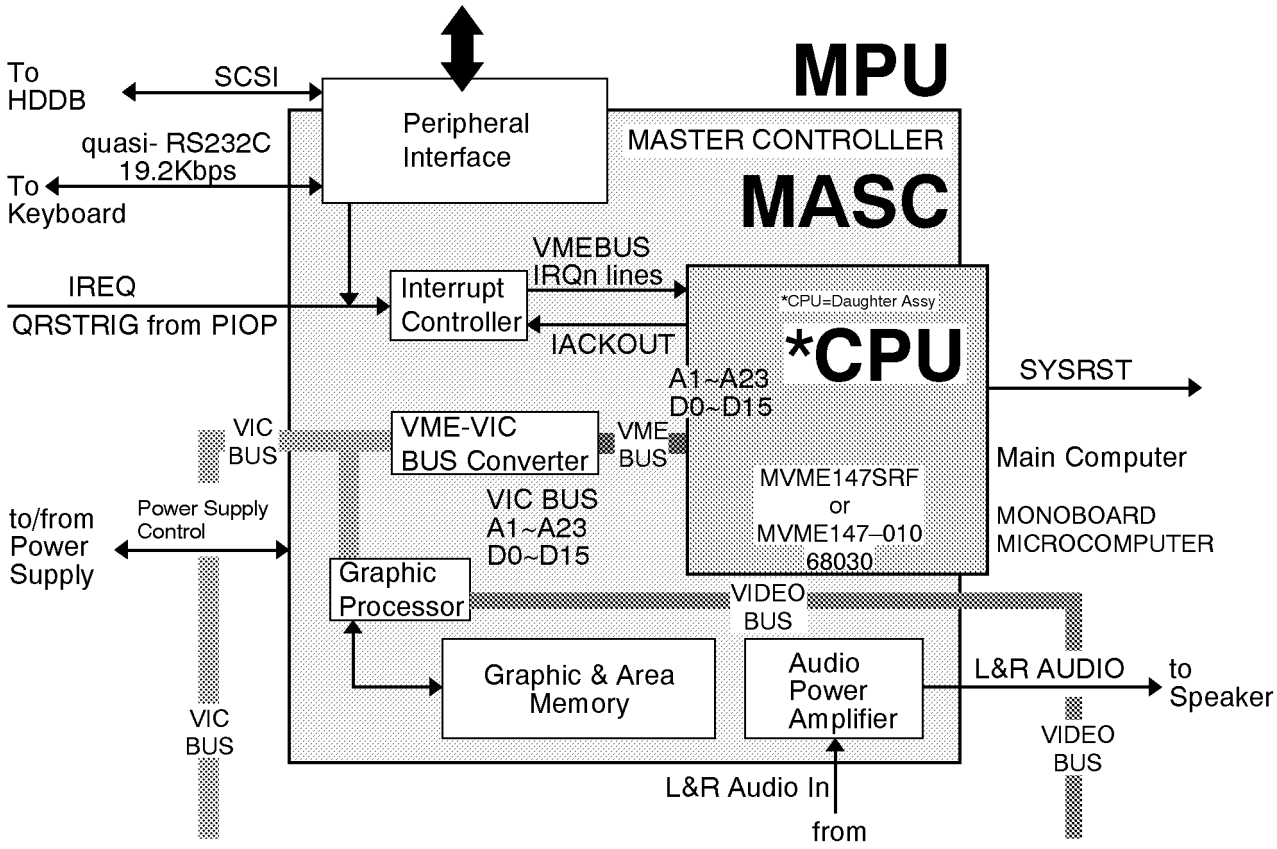
1–12–4 Signals to and from PIOP Board

The following signals are used by the Physiological Signal Processor Assy.

- RA, LF, RF : ECG (electrocardiogram) signals from the right and left feet and right hand of the patient.
- RBEEP : Test signal from the VIDO board, which is used in servicing, etc.
- QRSTRIG* : Trigger signal for detection of R wave in ECG.
- DELAY1*, DELAY2* : Trigger signals delivered as delayed predetermined times from QRSTRIG*.

1–13 MASTER CONTROLLER AND CPU (MPU) ASSY

1–13–1 MPU Assy Block Diagram



MASTER CONTROL ASSY BLOCK DIAGRAM
ILLUSTRATION 1–16

1–13–2 MPU Assy Overview

The MPU Assy consists of the Master Control block and the main CPU block. The MPU Assy includes a main CPU, an Interrupt Controller, a Graphic Controller, and a VME Bus to VIC Bus Interface. The MPU Assy also includes audio amplifier for output to the speaker(s).

1–13–3 MPU Assy Block Diagram Explanation

1. CPU : A Motorola on board computer (CPU), MVME147SRF, handles the transmitting and receiving of signals within the Master Control (MASC) block using VME bus.

2. Interrupt Controller : Receives interrupt request signals from the MPU Assy or other system assemblies. The Interrupt controller then sends the signals to the CPU of the MPU Assy as IRQn * signals. The Interrupt Controller receives the interrupt request signals based on VIC Bus specifications and the Interrupt controller sends the interrupt request signals using VME Bus specifications.

3. Graphic Controller : This block consists of a Graphic Processor and a Graphic Memory. The graphic controller manages the graphic function for the CRT monitor. The VIC Bus sends character and graphic control signals via the Graphic Processor to the Graphic Memory to store characters and graphics. The Graphic Processor sends CRT display data, received from the Graphic Memory, to the VIDEO Bus.

4. Image Area Controller : Controls image area on the CRT monitor screen for B–mode, M–mode, and Doppler–mode in both Black and White, and Color. The Advanced Graphics Display Controller (AGDC) writes area control data according to the program from the CPU.

5. VME Bus to VIC Bus Converter : Converts the VME Bus from the CPU to VIC Bus and vice versa.

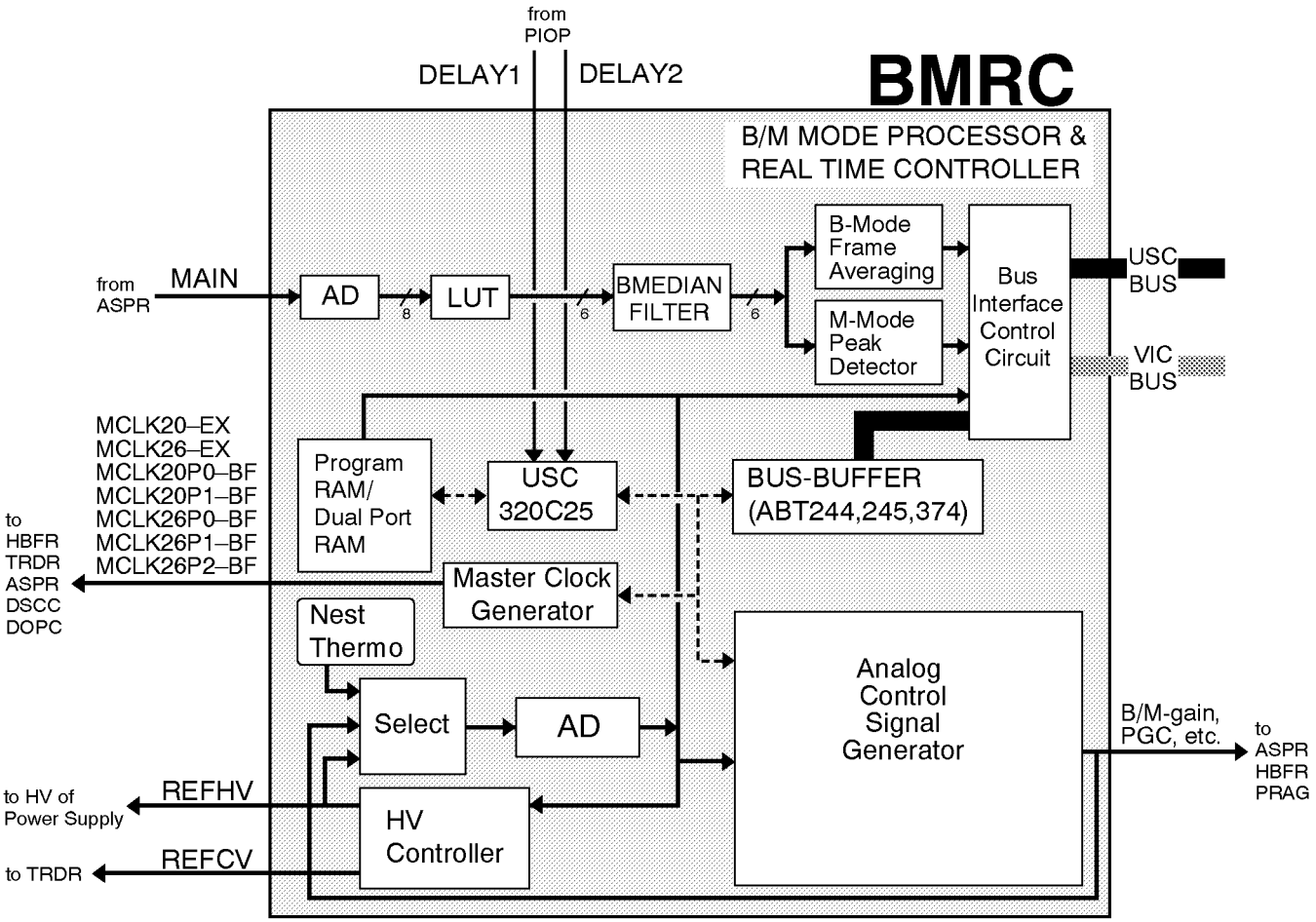
6. Peripheral Interface : The Peripheral Interface acts as the input/output port to other system components as follows :

    - Input and Output to SCSI : For the Hard Disk Drive and Magneto Optical Disk(MOD).
    - Input and Output of RS232C : For InSite and Options – Color Printer, Video Cassette Recorder, and Multi–Image Camera.
    - Serial Communication Port for the Keyboard.
    - Foot Switch Interface.
    - Polaroid Camera Control Port.
    - TV printer Control Port.
    - Cooling Fan Monitor Port .
    - AC Switch Monitor Input Port : After the power switch is turned OFF, the CPU saves current files. The unit will then disconnect the main power through the AC Relay Control Output Port on the MPU Assy.
    - AC Relay Control Output Port.

7. Audio Amplifier : Receives audio signals from the video signal processing assembly (VIDO Assy for Color system or VIDM Assy for B/W system). The audio signals are amplified and sent to the speaker(s) in the CRT unit as AUDIO signals.

1–14 B/M MODE PROCESSOR AND REAL TIME CONTROLLER (BMRC) ASSY

1–14–1 B/M Mode Processor and Real Time Controller Assy Block Diagram



B/M MODE PROCESSOR AND REAL TIME CONTROLLER ASSY BLOCK DIAGRAM
ILLUSTRATION 1–17

1–14–2 B/M Mode Processor and Real Time Controller Assy Overview

The B/M Mode Processor and Real Time Controller Assy consists of two blocks, B/M Mode Processor block and Real Time Controller block. The B/M Mode Processor block performs frame averaging for B–mode and peak detection for M–mode. The Real Time Controller block has a Digital Signal Processor for controlling scan lines. This block generates the Carrier frequency for demodulation of Doppler signals and basic clocks such as the Master clock and Trigger clock. This block also generates Quasi–Direct Memory Access (DMA) control for a USC bus.

1–14–3 B/M Mode Processor and Real Time Controller Assy Block Diagram Explanation

1. Analog to Digital (AD) Converter for B/M–mode : Converts B and M–mode analog echo signals into a 8–bit digital signal. This block also includes an anti–aliasing filter. Eight types of filters with different cut–off frequencies are used as selected.

2. Look Up Table (LUT) : Processes Gray Scale Mapping and Dynamic Range. The block has 32 kinds of tables, an input of 8 bits, and an output of 6 bits.

3. B–mode Frame Averaging and M–mode Peak Detector : Performs frame averaging when in B mode, and peak holding when in M mode. Buffer capacity for frame averaging is 256 (echo line) x 1024 (data) x 2(planes). Echo line data for combination focusing in B–mode is also done in this block.

4. B Median Filter : Performs filtering of a lateral B–mode median using data of adjacent three beams.

5. BUS Interface Control : Controls input and output of data and parameters to and from USC and VIC buses.

6. Ultrasonic Scan Controller (USC 320C25) : Controls scan lines using the Ultrasonic Scan Control program in the Program RAM down–loaded via the VIC Bus. The Ultra Sonic Control uses the Digital Signal Processor (DSP, TMS320C25) from Texas Instruments. The Master Clock Generator sends a 40 MHz clock to the Digital Signal Processor.

7. Program RAM/Dual–port RAM : Stores Ultra Sonic Control programs, sent by the hard disk drive, to the CPU on the MPU Assy and then the program is transferred to the Program RAM of this Assy. The dual–port RAM is used for communications with the CPU through the VIC bus. These memories, the program RAM and the dual–port RAM, are connected to both the VIC and DSP buses.

8. Bus–Buffer : Drives the USC bus in the Mother Assy. Only the data bus is bi–directional. The buffer stores 5 bit addresses, 16 bit data, write pulse, read pulse and reset pulse. The write cycle is 100 ns and read cycle is 200 ns. The logic levels are all TTL. This bus–buffer block also converts the DSP bus to the USC bus.

1–14–3 B/M Mode Processor and Real Time Controller Assy Block Diagram Explanation (Continued)

9. Master Clock Generator : Generates the following clock pulses from a 80 MHz Oscillator;

    - MCLK20–EX : 20 MHZ clock for general use.
    - MCLK26–EX : 26.666 MHz clock for general use.
    - MCLK20P0–BF, P1–BF : 20 MHz clock for the TRDR Assy. Phase difference is 25.0 ns between MCLK20P0–BF and MCLK20P1–BF.
    - MCLK26P0–BF, P1–BF, P2–BF : 26.666 MHz clock for the HBFR Assy. Phase difference is 12.5 ns among MCLK26P0–BF, MCLK26P1–BF, and MCLK26P2–BF.
    - TRIG : Trigger signal to set timing of transmitting and receiving signals for acoustic signals. (general use)
    - RGP : Range Gate Pulse for the Pulse Doppler signals of the ASPR Assy.
    - C4XCLK–ASPR : Four times–Carrier Frequency Clock for the Doppler demodulation signals of the ASPR Assy.
    - TRIG–START–ASPR : Synchronized pulse for the Doppler demodulation signals of the ASPR Assy.
    - CLK300N–MID : 300 ns clock for the DOPC Assy.

10. High Voltage Controller (HV controller) : The CPU controls output high voltage using this block. Analog signal, 0 to 4 volts for REFHV, sets high voltage to the High Voltage Assy. Analog signal, 0 to 4 volts for REFCV, sets high voltage to the TRDR Assy.

11. Analog Control Signal Generator : Generates SFC, SGC, B–GAIN, and M–GAIN which are controlled by the USC. It also generates PGC, TFC, TGC, and BFGC which are controlled by the CPU. These eight analog signals are sent to the ASPR, HBFR, and PRAG Assemblies.

12. Selector, and AD : Selects analog signals using a 24–channel multiplexer and performs Analog to Digital Conversion. It receives analog signals for monitoring the system. The selector and the AD are controlled by the CPU.

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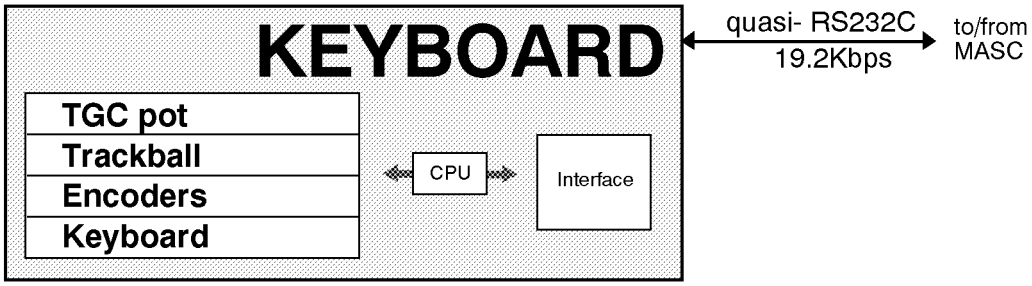
1–15 KEYBOARD ASSY

1–15–1 Keyboard Assy Block Diagram



KEYBOARD ASSY BLOCK DIAGRAM
ILLUSTRATION 1–18

1–15–2 Keyboard Assy Overview

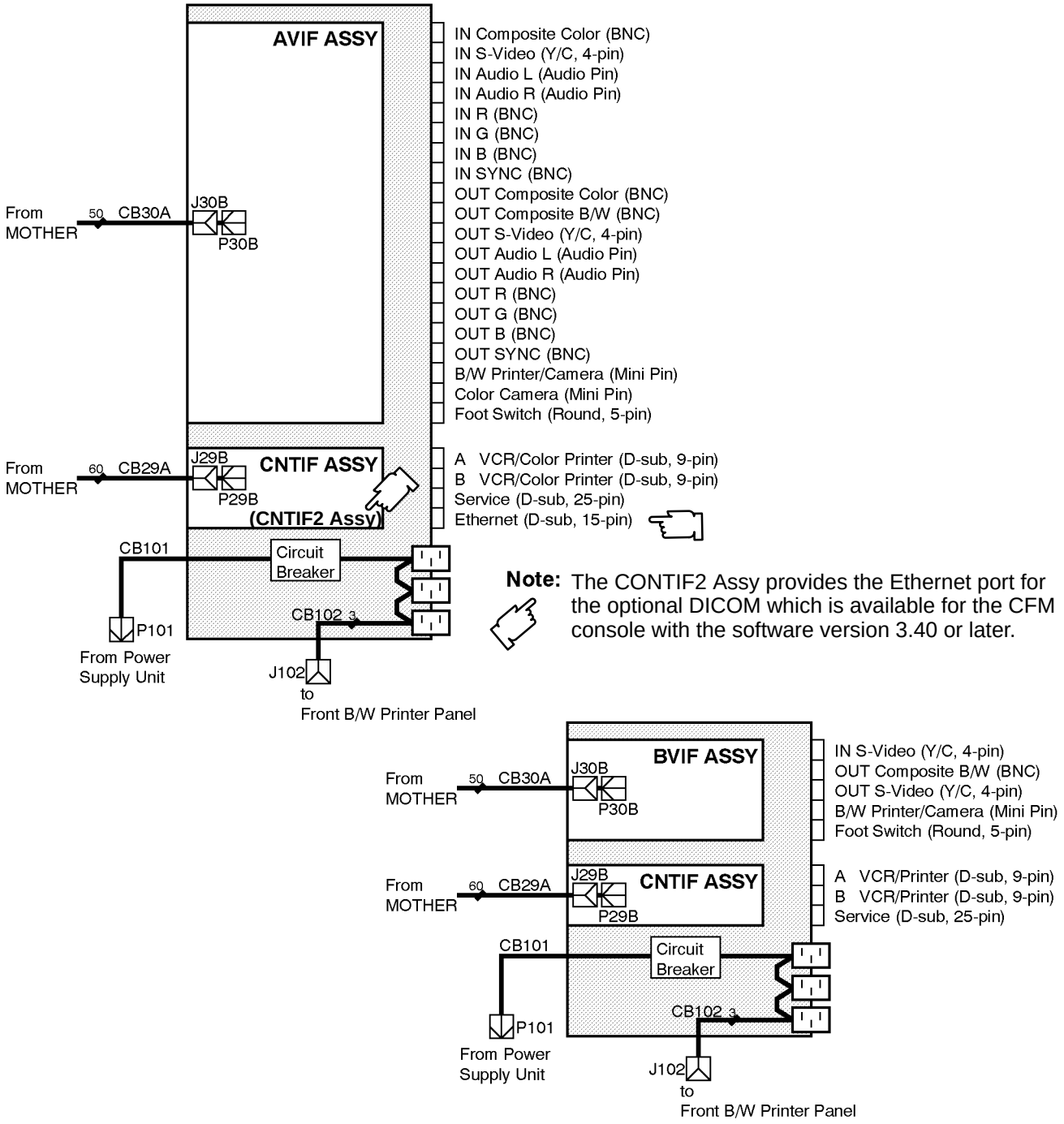
The keyboard consists of control keys, alphanumeric keys, TGC potentiometers, a rotary encoder, and a trackball, etc. The keyboard has a CPU. When a key is pressed, an inherent key code for that key is transmitted to the main system (ultrasound scanner). Potentiometers, encoder and trackball, allow the amount of physical movement to be transmitted to the main system. The LEDs can be turned on and off under the control of the main system. For communication, quasi–RS232C is used with a Baud rate of 19.2 kbps. The keyboard is connected to the main system by a single flat cable consisting of 30 conductors including those for serial communication signal and the system reset signal. The keyboard is also supplied with a power of +5 V from the main system.

1–15–3 Keyboard Assy Block Diagram Explanation

1. Interface : quasi– RS–232C, Data Transfer Rate: 19.2kbps/4.8kbps (for testing)
2. CPU: for key scan and command processing
    - Model : 8751H (by Intel) or equivalent, Clock frequency : 7.373 MHz
3. TGC potentiometers : The keyboard has 8 TGC potentiometers disposed in the direction of depth.
4. Trackball : The trackball is used to move various cursors and areas on the CRT display screen. The cursor or area is selected using the corresponding key located near the trackball.
5. Encoder : The Number of clicks (per rotation) and diameter of control (in mm) are as shown below:
    - B/M gain/cine scroll 40 clicks, 33 mm diameter.
    - Depth 20 clicks, 22 mm diameter.
    - Zoom size/rotation 20 clicks, 16 mm diameter.
    - Angle 20 clicks, 22 mm diameter.
    - Gain (Doppler/CFM) 20 clicks, 22 mm diameter.
    - Audio volume 20 clicks, 22 mm diameter.
6. Key switches : Include non–illuminated alphanumeric keys and function keys. Membrane type keys
7. LEDs : Indicates the condition of key function, active (ON) or inactive (OFF).

1–16 REAR PANEL ASSY

1–16–1 Rear Panel Assy Block Diagram



REAR PANEL ASSY BLOCK DIAGRAM
ILLUSTRATION 1–19

1–16–2 Rear Panel Assy Overview

The Rear Panel Assy is intended to provide an interface between the unit and peripheral equipment. The Rear Panel Assy for the color monitor console consists of the AVIF Assy and CNTIF Assy. The Rear Panel Assy for the B/W monitor console consists of the BVIF Assy and CNTIF Assy.

1–16–3 AVIF Assy

This circuit board is intended to provide an interface between the color monitor console and an external recording device for transfer of various video signals, foot–switch control signal, Black/White and color Polaroid camera control signals, and Black/White printer control signals.

1–16–4 BVIF Assy

This circuit board is intended to provide an interface between the B/W monitor console and an external recording device for transfer of various video signals, foot–switch control signal, and Black/White Polaroid camera or printer control signals.

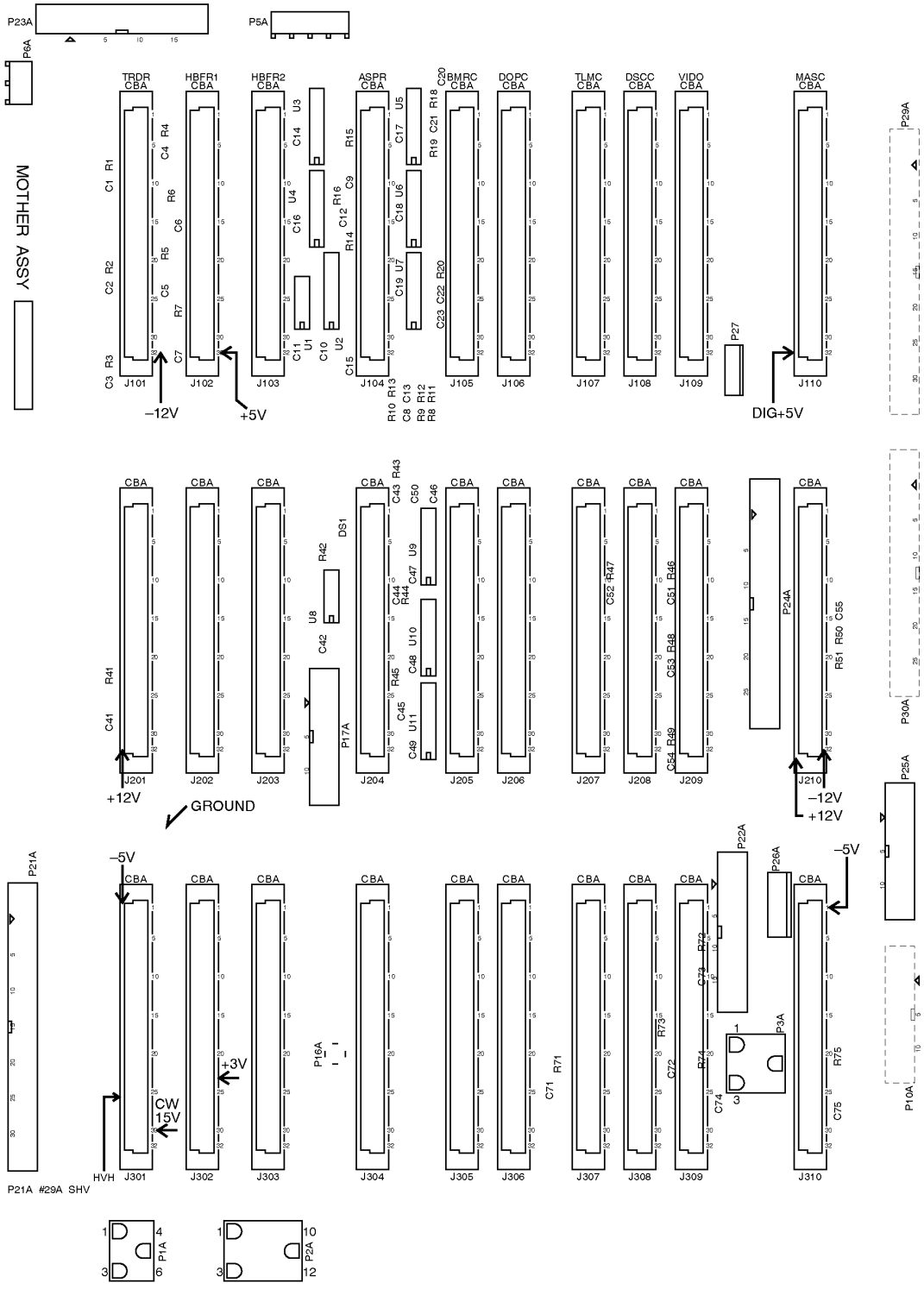
1–16–5 CNTIF(2) Assy

This circuit board is intended to provide an interface between the unit and an external recording unit for transfer of the RS232C control signals for color printer, VCR, MIC (multi–image camera) and modem.

The CNTIF2 Assy provides the additional Ethernet interface for the DICOM connetction.

1–17 MOTHER ASSY

1–17–1 Mother Assy Parts Location



MOTHER ASSY PARTS LOCATION
ILLUSTRATION 1–20

1–17–2 Mother Assy Overview

The Mother board's main function is to provide a link, via connectors, through which each Assy (circuit board) in the nest can communicate. Main buses and clock signals terminate at this Assy. The Mother Assy also has connectors for connecting the assemblies inside the nest to those outside the nest. In addition, the mother board has a bus isolation circuit located on the VIC and USC buses. During reception of echo signals, these buses are deactivated for both the front end and mid processor to prevent noise from entering into the analog circuit.

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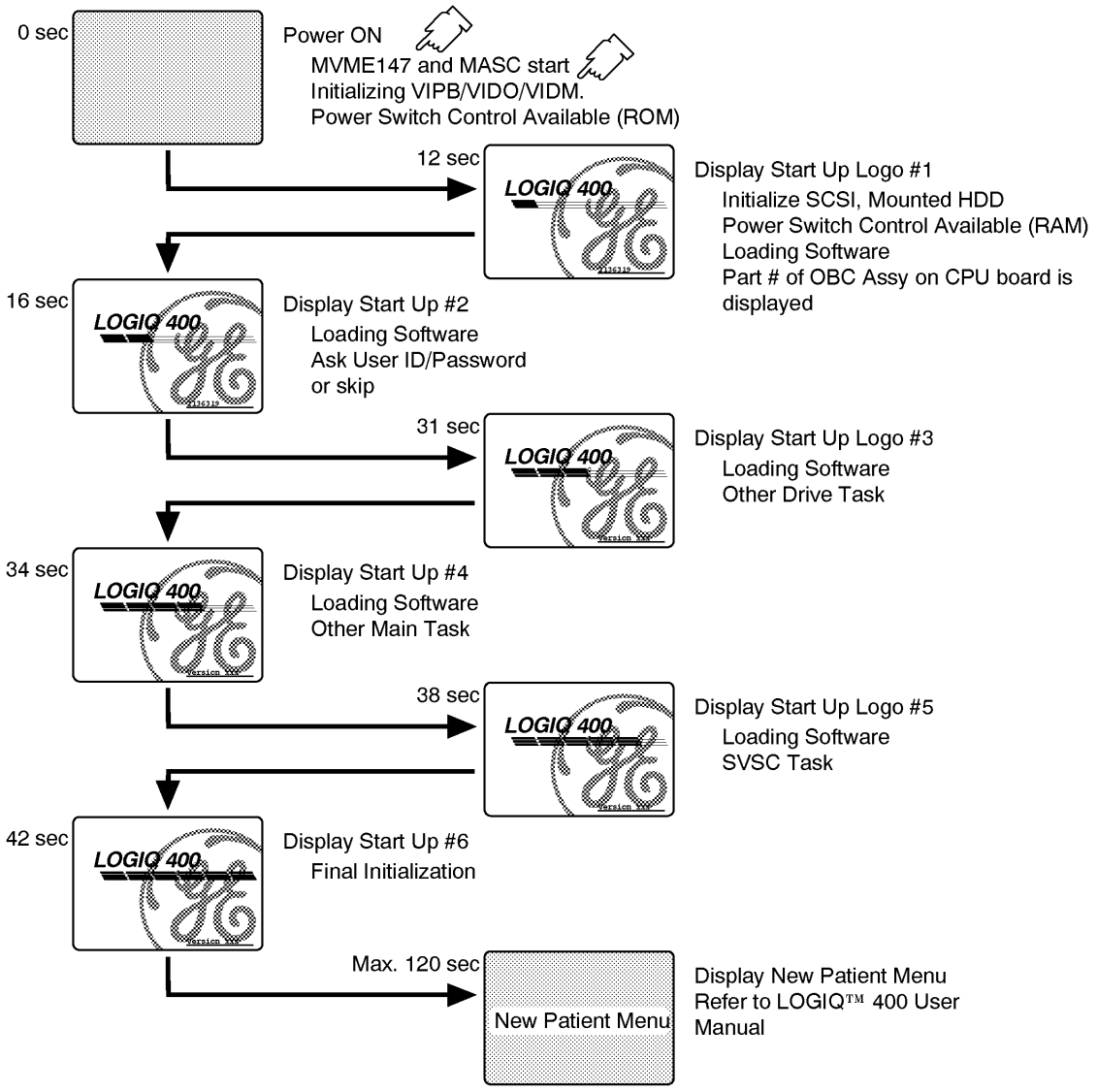
2–1 INTRODUCTION

The LOGIQ™ 400 has self–diagnosis functions for each board and each Assembly. And these self–diagnosis are divided into 2 levels, one is for the customer and service person, refer to the chapter 4 of the LOGIQ™ 400 service manual, the other is for GE service person only, this means GE proprietary.
This chapter uses troubleshooting trees and self–diagnosis functions as a guide to help the field engineer during corrective maintenance.

2–2 START–UP SEQUENCE

Understanding the Start–Up Sequence is important to execute Trouble Shooting. The ILLUSTRATION 2–1 indicates the brief explanation of LOGIQ™ 400 start–up sequence.



LOGIQ™ 400 START UP SEQUENCE
ILLUSTRATION 2–1

Note

The required time indicated at the side of each display on the above illustration is different depending on the status of console.

Note

From the console with the software version 3.00, “LOGIQ 400 MD” is displayed on the CRT monitor screen during the power-up sequence.

2–2 START–UP SEQUENCE (Continued)

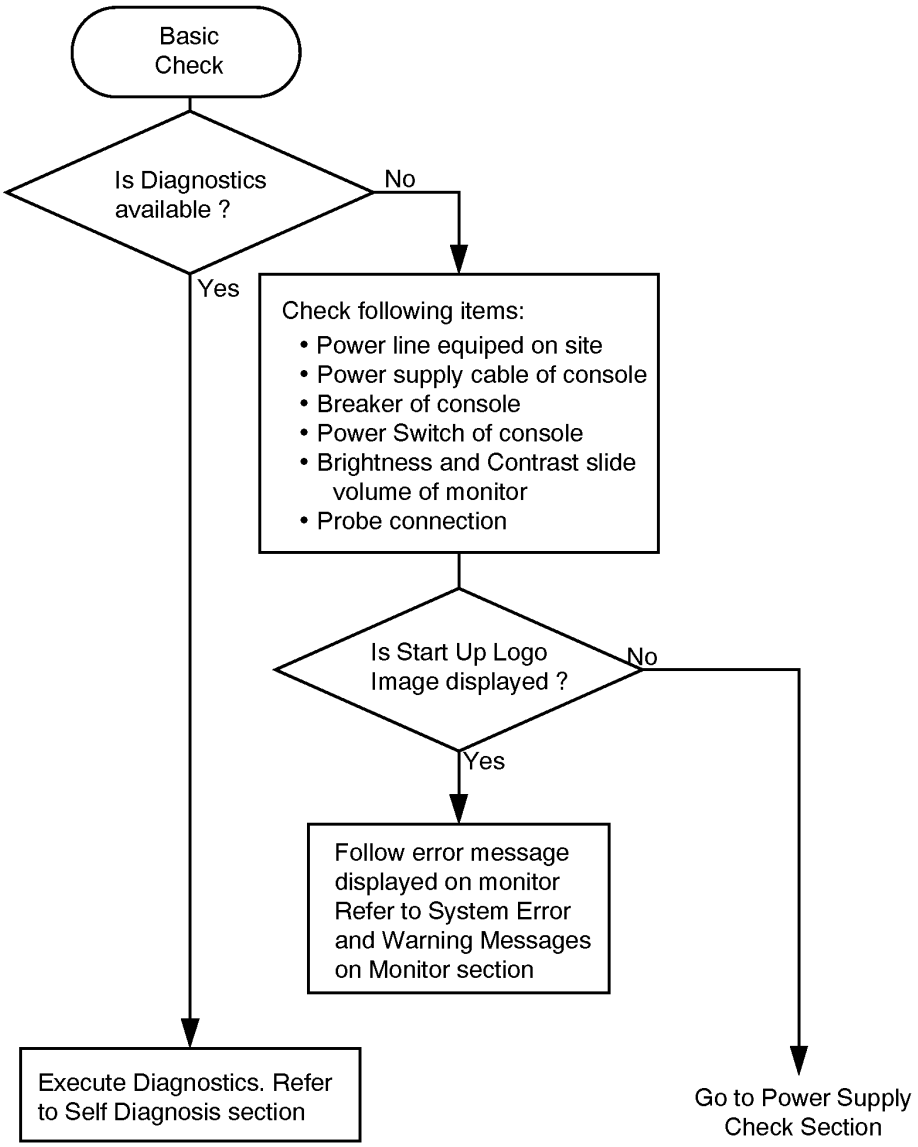
Note

The indication “LOGIQ 400CL” is displayed on the CRT monitor screen during the power-up sequence for the LOGIQ™ 400CL console.

2–3 Troubleshooting Procedures

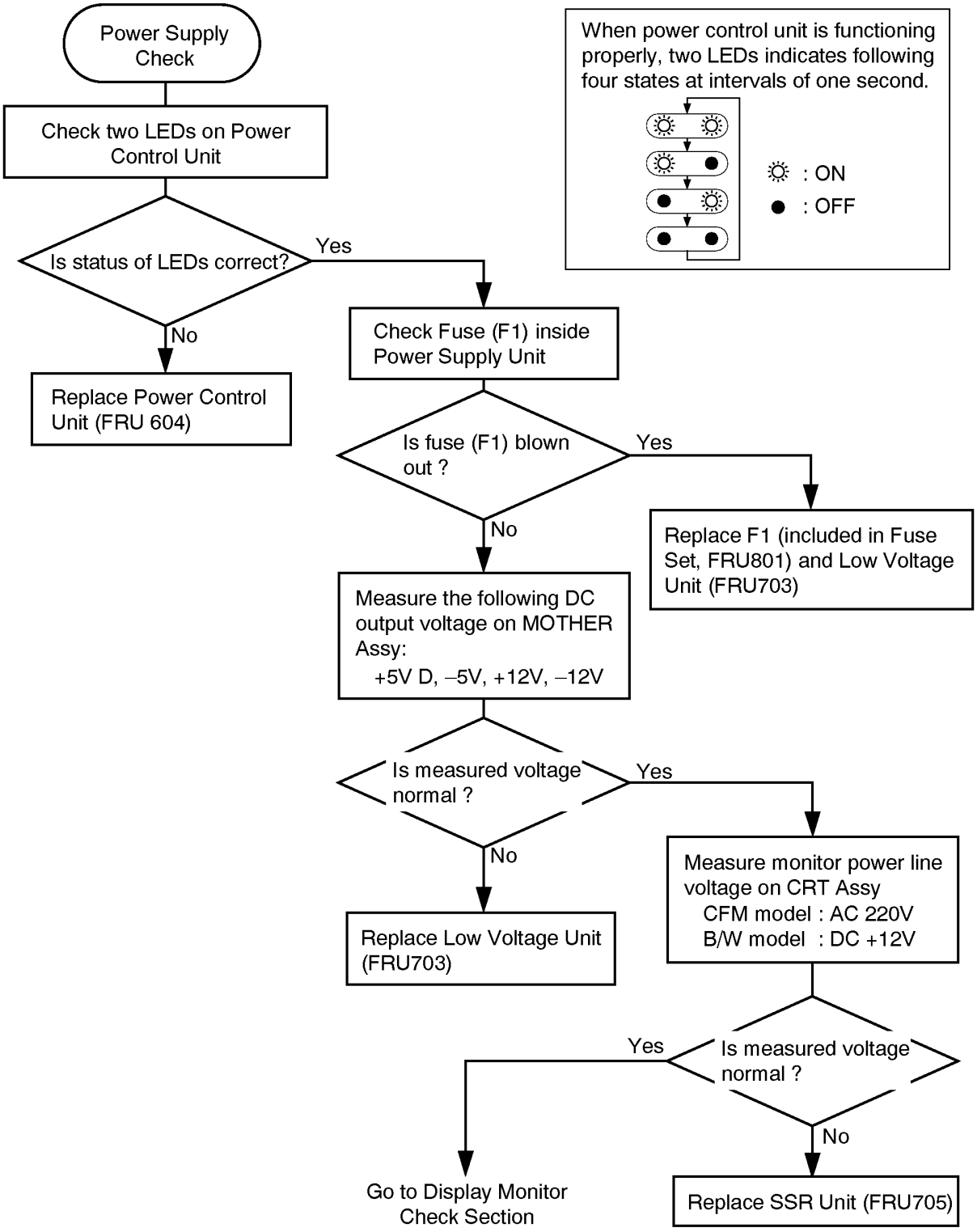
These troubleshooting trees are guide to help the field engineer during corrective maintenance.

2–3–1 Basic Checks


Basic Check
Is Diagnostics available ?
No
Yes
Check following items:
• Power line equiped on site
• Power supply cable of console
• Breaker of console
• Power Switch of console
• Brightness and Contrast slide volume of monitor
• Probe connection
Is Start Up Logo Image displayed ?
No
Yes
Follow error message displayed on monitor Refer to System Error and Warning Messages on Monitor section
Execute Diagnostics. Refer to Self Diagnosis section
Go to Power Supply Check Section

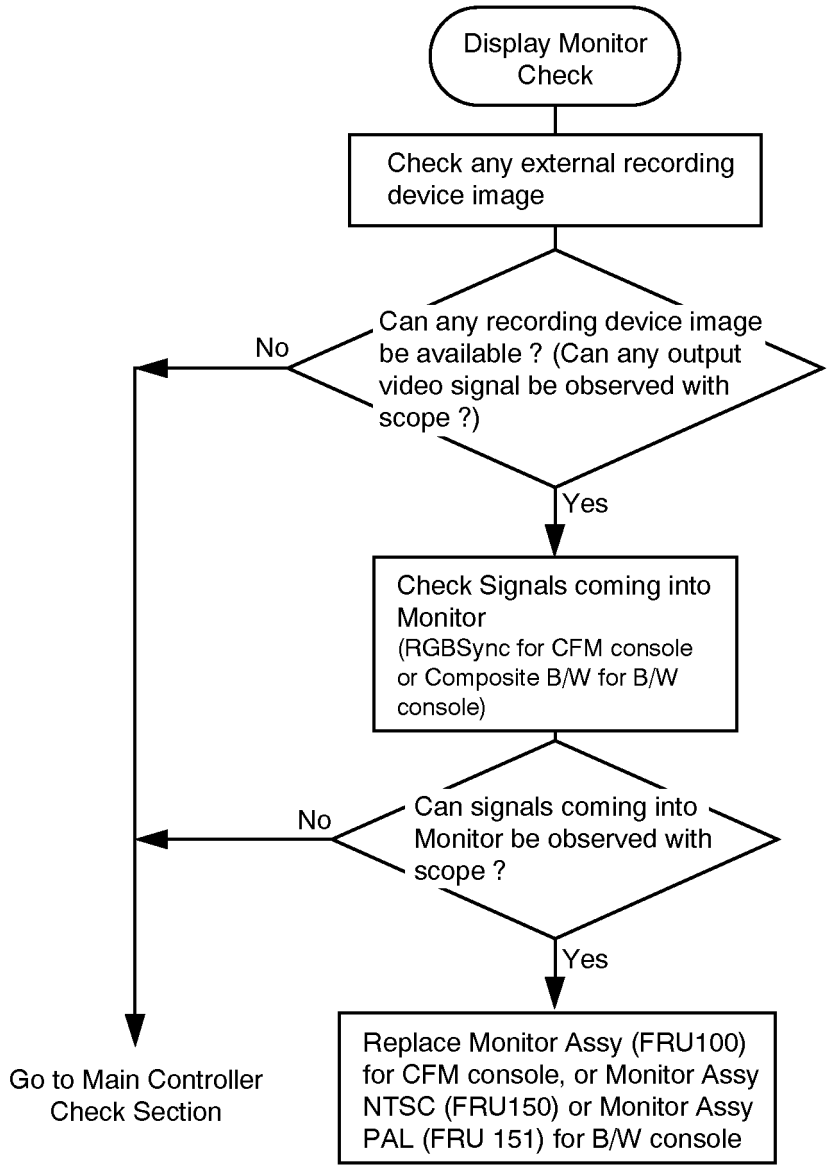
BASIC CHECK PROCEDURE
ILLUSTRATION 2–2

2–3–2 Power Supply Check


Power Supply Check
Check two LEDs on Power Control Unit
Is status of LEDs correct?
Yes
No
Replace Power Control Unit (FRU 604)
When power control unit is functioning properly, two LEDs indicates following four states at intervals of one second.
: ON
: OFF
Check Fuse (F1) inside Power Supply Unit
Is fuse (F1) blown out ?
Yes
No
Replace F1 (included in Fuse Set, FRU801) and Low Voltage Unit (FRU703)
Measure the following DC output voltage on MOTHER Assy:
+5V D, –5V, +12V, –12V
Is measured voltage normal ?
Yes
No
Replace Low Voltage Unit (FRU703)
Measure monitor power line voltage on CRT Assy
CFM model : AC 220V
B/W model : DC +12V
Is measured voltage normal ?
Yes
No
Go to Display Monitor Check Section
Replace SSR Unit (FRU705)

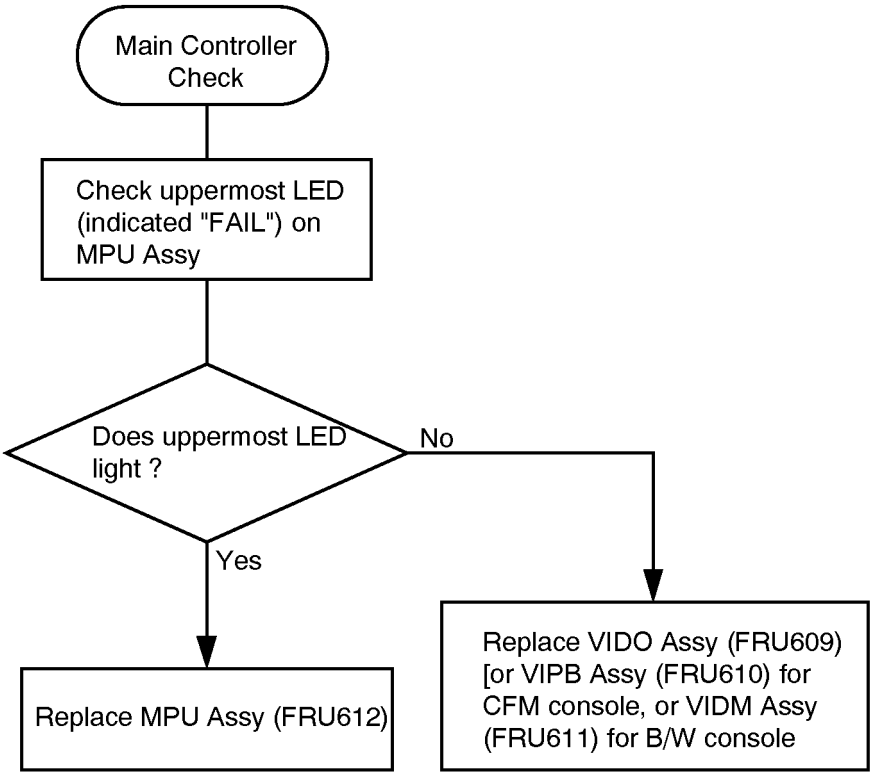
POWER SUPPLY CHECK PROCEDURE
ILLUSTRATION 2–3

2–3–3 Display Monitor Check


Display Monitor Check
Check any external recording device image
Can any recording device image be available ? (Can any output video signal be observed with scope ?)
No
Yes
Check Signals coming into Monitor
(RGBSync for CFM console or Composite B/W for B/W console)
Can signals coming into Monitor be observed with scope ?
No
Yes
Go to Main Controller Check Section
Replace Monitor Assy (FRU100) for CFM console, or Monitor Assy NTSC (FRU150) or Monitor Assy PAL (FRU 151) for B/W console

DISPLAY MONITOR CHECK PROCEDURE
ILLUSTRATION 2–4

2–3–4 Main Controller Check


Main Controller Check
Check uppermost LED (indicated "FAIL") on MPU Assy
Does uppermost LED light ?
No
Yes
Replace MPU Assy (FRU612)
Replace VIDO Assy (FRU609) [or VIPB Assy (FRU610) for CFM console, or VIDM Assy (FRU611) for B/W console

MAIN CONTROLLER CHECK PROCEDURE
ILLUSTRATION 2–5

2–3–5 System Error and Warning Messages on Monitor

This section provides the detailed explanations for LOGIQ™ 400 system error and warning messages.

TABLE 2–1 indicates the system error messages and some parts should be checked when each message is displayed.

The following part describes the troubleshooting procedures for each message indicated on the TABLE 2–1.

2–3–5 System Error and Warning Messages on Monitor (Continued)

TABLE 2–1
SYSTEM ERROR MESSAGES

Ref. No.	System Error Message	Parts should be checked: Hardware: HDD	MODD	POWER SUPPLY	PROBE	CONN–1	DCON	PRAG	TRDR	HBFR-1	HBFR-2	ASPR	BMRC	DOPC	TLMC	TDCB	DSCC	VIPB	VIDO	VIDM	MASC	ECG BOARD	KEYBOARD	FAN	Software
1	BUS ERROR. PC:######## AD:########								●	●	●	●	●	●	●	●	●	●	●	●	●				
2	FILE NOT FOUND. FILE:##########	●																							●
3	BOARD NON EXISTENT. BOARD:#####								●		●	●	●	●	●	●	●	●	●	●					
4	UNEXPECTED CPU EXCEPTION.																								●
5	ILLEGAL FILE FORMAT. FILE:##########	●	●																						●
6	LOCAL CPU ERROR BOARD:#####												●	●											●
7	INTERRUPT TIME OUT. BOARD:##### VECTOR:##																								
8	KEYBOARD IS NOT CONNECTED.																				●		●		
9	MEDIA IS NOT INITTIALIZED.	●	●	●																					
10	MEDIA IS FULL.	●	●																						
11	MEDIA IS NOT MOUNTED.	●	●	●																					
12	MEDIA IS LOCKED	●	●	●																					
13	[SHVST-PC]ERROR.			●	●	●	●																		
14	[SHVST-TRG]ERROR.			●	●	●	●																		
15	[SDSTST]ERROR.			●	●	●	●																		
16	SCSI ERROR. DEVICE:### CODE:########	●	●																		●				●
17	WARNING: HV Abnormal. HVCOMP								●				●												
18	WARNING: HV Abnormal. USC_INT			●									●												
19	WARNING: KEYBOARD IS BUSY.																						●		
20	WARNING: Cooling Fan Failure.			●																				●	
21	WARNING: Temperature error			●									●											●	
22	WARNING: HV Abnormal. PCONT			●																					
23	WARNING: HV Abnormal. PCONT232			●																					
24	BOARD REVISION ERROR BOARD: DOPC													●											

● : indicates tha part should be checked when each error message is displayed.

2–3–5 System Error and Warning Messages on Monitor (Continued)

[1] . BUS ERROR

PC and AD are displayed with error message on the CRT monitor. PC indicates the program counter and AD indicates the accessed memory address.

1. Check the address displayed with the error message. Refer to TABLE 2–2.

TABLE 2–2
ADDRESS MAP

Memory Area Address Map

ADDRESS	BOARD
F000 0000 – F03F FFFF	MASC
F040 0000 – F07F FFFF	VIPB, VIDO, VIDM
F080 0000 – F0BF FFFF	*1
F0C0 0000 – F0FF FFFF	*1
F100 0000 – F13F FFFF	TLMC, TDCB
F140 0000 – F17F FFFF	TLMC, TDCB
F180 0000 – F1BF FFFF	TLMC, TDCB
F1C0 0000 – F1FF FFFF	TLMC, TDCB
F200 0000 – F23F FFFF	DSCC, TDCB
F240 0000 – F27F FFFF	*1
F280 0000 – F2BF FFFF	*1
F2C0 0000 – F2FF FFFF	TLMC, TDCB
F300 0000 – F33F FFFF	DOPC
F340 0000 – F37F FFFF	BMRC
F380 0000 – F3BF FFFF	BMRC
F3C0 0000 – F3FF FFFF	*1
F400 0000 – F43F FFFF	ASPR
F440 0000 – F47F FFFF	*1
F480 0000 – F4BF FFFF	*1
F4C0 0000 – F4FF FFFF	*1
F500 0000 – F53F FFFF	HBFR-1
F540 0000 – F57F FFFF	HBFR-2
F580 0000 – F5BF FFFF	*1
F5C0 0000 – F5FF FFFF	*1
F600 0000 – F63F FFFF	TRDR
F640 0000 – F67F FFFF	TRDR
F680 0000 – F6BF FFFF	TRDR
F6C0 0000 – F6FF FFFF	TRDR

* 1: Not Used

Register Area Address Map

ADDRESS	BOARD
FFFF F000 – FFFF F03F	MASC
FFFF F040 – FFFF F07F	VIPB, VIDO, VIDM
FFFF F080 – FFFF F0BF	*1
FFFF F0C0 – FFFF F0FF	*1
FFFF F100 – FFFF F13F	TLMC, TDCB
FFFF F140 – FFFF F17F	TLMC, TDCB
FFFF F180 – FFFF F1BF	TLMC, TDCB
FFFF F1C0 – FFFF F1FF	TLMC, TDCB
FFFF F200 – FFFF F23F	DSCC, TDCB
FFFF F240 – FFFF F27F	*1
FFFF F280 – FFFF F2BF	*1
FFFF F2C0 – FFFF F2FF	TLMC, TDCB
FFFF F300 – FFFF F33F	DOPC
FFFF F340 – FFFF F37F	BMRC
FFFF F380 – FFFF F3BF	*1
FFFF F3C0 – FFFF F3FF	*1
FFFF F400 – FFFF F43F	ASPR
FFFF F440 – FFFF F47F	*1
FFFF F480 – FFFF F4BF	*1
FFFF F4C0 – FFFF F4FF	*1
FFFF F500 – FFFF F53F	HBFR-1
FFFF F540 – FFFF F57F	HBFR-2
FFFF F580 – FFFF F5BF	*1
FFFF F5C0 – FFFF F5FF	*1
FFFF F600 – FFFF F63F	TRDR
FFFF F640 – FFFF F67F	TRDR
FFFF F680 – FFFF F6BF	TRDR
FFFF F6C0 – FFFF F6FF	*1

* 1: Not Used

2. Replace the board assembly corresponding with the address displayed with error message.
3. Replace the HDD Assy.
4. Replace the MPU Assy.

2–3–5 System Error and Warning Messages on Monitor (Continued)

[2] . FILE NOT FOUND

When the indicated file should be in MO (Magnetic Optical) disk:

1. Check that the required disk to use activated function is installed properly.
2. Check that the installed disk is formatted properly.
3. Check that the installed disk has proper data.

When the indicated file should be in hard disk:

1. Replace the HDD Assy.

[3] . BOARD NON EXISTENT

1. Check the connection of board indicated by error message.
2. If the board is properly connected, replace the board with new one.

[4] . UNEXPECTED CPU EXCEPTION

1. Replace the HDD Assy.
2. Replace the MPU Assy.

[5] . ILLEGAL FILE FORMAT

When the indicated file should be in MO (Magnetic Optical) disk:

1. Check that the required disk to use activated function is installed properly.
2. Check that the installed disk is formatted properly.
3. Check that the installed disk has proper data.

When the indicated file should be in hard disk:

1. Replace the HDD Assy.

[6] . LOCAL CPU ERROR

When the DOPC is indicated:

1. Replace the HDD Assy.
2. Replace the DOPC Assy.

When the BMRC is indicated:

1. Replace the HDD Assy.
2. Replace the BMRC Assy.

2–3–5 System Error and Warning Messages on Monitor (Continued)

[7] . INTERRUPT TIME OUT

Current system software is not designed on the premise that this error message appears. We do not have any ways to check troubles if this error message is displayed. In this case, contact your service support center.

[8] . KEYBOARD IS NOT CONNECTED

1. Check that the keyboard is connected properly.

[9] . MEDIA IS NOT INITIALIZED

1. Check that the medium is initialized properly.

[10] MEDIA IS FULL

1. Check the capacity of installed medium.

[11] MEDIA IS NOT MOUNTED

1. Check that the medium is installed properly into the correct drive.

[12] MEDIA IS LOCKED

1. Check that the write protection of medium is not locked.

[13] [SHVST–PC] ERROR

1. Check the probes connected with console.
2. Check the DCON Assy or CONN1 Assy.
3. Check the Power Supply.

[14] [SHVST–TRG] ERROR

1. Check the probes connected with console.
2. Check the DCON Assy or CONN1 Assy.
3. Check the Power Supply.

[15] [SDSTST] ERROR

1. Check the probes connected with console.
2. Check the DCON Assy or CONN1 Assy.
3. Check the Power Supply.

2–3–5 System Error and Warning Messages on Monitor (Continued)

[16] SCSI ERROR

Each device number indicates the following SCSI device.

TABLE 2–3
DEVICE NUMBER

NUMBER	DEVICE
0.#	HDD
2.#	MODD

TABLE 2–4 and TABLE 2–5 describe the error code, meaning, and parts should be checked.

1. Check the SCSI device, software (stored in HDD Assy), or CPU board (included in MPU Assy) depending on the error code displayed with this error message. Refer to TABLE 2–4 and TABLE 2–5.
2. Replace the defective part as necessary.

2–3–5 System Error and Warning Messages on Monitor (Continued)

TABLE 2–4
SCSI ERROR MESSAGES

ERROR CODE	MEANING	PARTS SHOULD BE CHECKED (POSSIBLE CAUSE)
0x00020000L	Error return from pSOS+	CPU Board or Software
0x00020100L	Invalid Minor Number	Software
0x00020102L	Not supported function	Software
0x00020301L	Recovered error	[This indicates that error has been repaired]
0x00020302L	Not Ready	SCSI Device indicated by device code
0x00020303L	Medium error	SCSI Device indicated by device code
0x00020304L	Hardware error	SCSI Device indicated by device code
0x00020305	Illegal request	SCSI Cable or Software
0x00020306	Unit attention	[This indicates that device is restarted]
0x00020307	Data protect	SCSI Device indicated by device code
0x00020308	Blank check	SCSI Device indicated by device code
0x0002030A	Copy aborted	SCSI Device indicated by device code
0x0002030B	Aborted command	SCSI Device indicated by device code
0x0002030C	Equal	[This indicates that command has been completed normally]
0x0002030D	Volume overflow	Software
0x0002030E	Miscompare	SCSI Cable or SCSI Device indicated by device code
0x00020164	Arbitration time out	Software, SCSI Cable, or SCSI Device indicated by device code
0x00020165	Lost arbitration	Software, SCSI Cable, or SCSI Device indicated by device code
0x00020166	Selection error	SCSI Cable Connection or SCSI ID of SCSI Device indicated by device code
0x00020167	SCSI bus parity error	SCSI Cable
0x00020168	SCSI communication phase error	Software, SCSI Cable, or SCSI Device indicated by device code
0x00020169	DMA xfer bus error	CPU Board on MPU Assy
0x0002016A	Illegal bus free	SCSI Cable or SCSI Device indicated by device code
0x0002016B	SCSI bus phase of reset condition	SCSI Cable or SCSI Device indicated by device code
0x0002016C	SCSI bus phase mismatch	SCSI Cable or SCSI Device indicated by device code
0x0002016D	Unexpected SCSI bus free	SCSI Cable or SCSI Device indicated by device code
0x0002016E	DMA transfer error	CPU Board on MPU Assy
0x0002016F	Illegal interrupt	CPU Board, SCSI Cable, or SCSI Device indicated by device code
0x00020170	CDB transfer size error	CPU Board, Software, or SCSI Device indicated by device code
0x00020180	Hardware error (SCSI)	CPU Board or SCSI Device indicated by device code
0x00020201	No index/Sector signal	SCSI Device indicated by device code
0x00020202	No seek complete	Not used
0x00020203	Write fault	SCSI Device indicated by device code
0x00020204	Drive not ready	SCSI Device indicated by device code
0x00020205	Drive not select	Not used
0x00020206	No track zero found	SCSI Device indicated by device code
0x00020207	Multiple drivers selected	Not used
0x00020208	Logical unit communication failure	SCSI Device indicated by device code
0x00020209	Track following error	SCSI Device indicated by device code
0x00020210	ID CRC or ECC error	SCSI Device indicated by device code
0x00020211	Unrecovered read error of data block	SCSI Device indicated by device code
0x00020212	No address mark found in ID field	SCSI Device indicated by device code
0x00020213	No address mark found in data field	SCSI Device indicated by device code
0x00020214	No recode found	SCSI Device indicated by device code
0x00020215	Seek positioning error	SCSI Device indicated by device code

2–3–5 System Error and Warning Messages on Monitor (Continued)

TABLE 2–5
SCSI ERROR MESSAGES (CONTINUED)

ERROR CODE	MEANING	PARTS SHOULD BE CHECKED (POSSIBLE CAUSE)
0x00020216	Data synchronization mark error	Not used
0x00020217	Recovered read data with target's read retries	[This indicates that error has been repaired]
0x00020218	Recovered read data with target's ECC correction	[This indicates that error has been repaired]
0x00020219	Defect list error	SCSI Device indicated by device code
0x0002021A	Parameter overrun	Not used
0x0002021B	Synchronous transfer error	SCSI Cable or SCSI Device indicated by device code
0x0002021C	Primary defect list not found	SCSI Device indicated by device code
0x0002021D	Compare error	Not used
0x0002021E	Recovered ID target's ECC correction	Not used
0x00020220	Invalid command operation code	SCSI Cable or Software
0x00020221	Illegal logical block address	SCSI Cable or Software
0x00020222	Illegal function for device type	Not used
0x00020224	Illegal field in CDB	SCSI Cable or Software
0x00020225	Invalid LUN	SCSI Cable or Software
0x00020226	Invalid field in parameter list	SCSI Cable or Software
0x00020227	Write protected	SCSI Cable or Software
0x00020228	Medium changed	[This specifies that medium has been changed]
0x00020229	Power on or reset or bus device reset occured	[This indicates that device is resetting]
0x0002022A	Mode select parameters changed	[This indicates one of command sequences]
0x0002022C	Illegal command sequence	SCSI Cable or Software
0x00020230	Incompatible cartridge	MODD or MO (Magneto Optical) Disk
0x00020231	Medium format corrupted	Media or SCSI Device indicated by device code
0x00020232	No defect spare location a variable	SCSI Device indicated by device code
0x00020237	Rounded parameter	[This indicates that error has been repaired]
0x0002023D	Defect list not available	SCSI Device indicated by device code
0x0002023E	Logical unit has not self-configured yet	Software or SCSI Device indicated by device code
0x00020240	RAM failure	SCSI Device indicated by device code
0x00020241	Data path diagnostic failure	SCSI Cable or SCSI Device indicated by device code
0x00020242	Power on diagnostic failure	SCSI Device indicated by device code
0x00020243	Message reject error	CPU Board, SCSI Cable, or SCSI Device indicated by device code
0x00020244	Internal controller error	SCSI Device indicated by device code
0x00020245	Select/reselect failed	CPU Board, SCSI Cable, or SCSI Device indicated by device code
0x00020246	Unsuccessful soft reset	Not used
0x00020247	SCSI interface parity error	SCSI Cable or SCSI Device indicated by device code
0x00020248	Initiator detected error	CPU Board, SCSI Cable, or SCSI Device indicated by device code
0x00020249	Inappropriate/illegal message	SCSI Cable or Software
0x0002024C	Logical unit failed self-configured	SCSI Device indicated by device code
0x00020298	Request-acknowledge time out	CPU Board, SCSI Cable, or SCSI Device indicated by device code
0x000202DC	ROM failure	SCSI Device indicated by device code
0x000202A0	Servo data error	SCSI Device indicated by device code
0x000202A1	Servo check	SCSI Device indicated by device code

2–3–5 System Error and Warning Messages on Monitor (Continued)

The following messages, [17] to [23] are the warning message. These messages are displayed temporarily and are not stored in error log file.

[17] WARNING: HV Abnormal. HVCOMP

1. Check the BMRC Assy.
2. Check the TRDR Assy.

[18] WARNING: HV Abnormal. USC_INT

1. Check the BMRC Assy.
2. Check the Power Supply.

[19] WARNING: KEYBOARD IS BUSY.

1. Check the Keyboard.

[20] WARNING: Cooling Fan Failure

1. Check the NEST FAN Assy.
2. Check the HV FAN.

[21] WARNING: Temperature Error

1. Check the NEST FAN Assy.
2. Check the Power Supply.
3. Check the BMRC Assy.

[22] WARNING: HV Abnormal. PCONT

1. Check the Power Supply.

[23] WARNING: HV Abnormal. PCONT232

1. Check the RS232C cable between the Power Supply and Mother board.
2. Check the Power Supply.

[24] BOARD REVISION ERROR

1. Check the DOPC Assy.

Note

In case of the console with the system software version 3.00 or later, activating the optional CFM/PDI Enhancement software causes the system without the new DOPC Assy (2123311–3) to display the error message “BOARD REVISION ERROR, BOARD: DOPC”. Install the proper DOPC Assy in the system or set the CFM/PDI Enhancement software option to “Not Installed”.

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2–4 SERVICE MENU

Key Operation

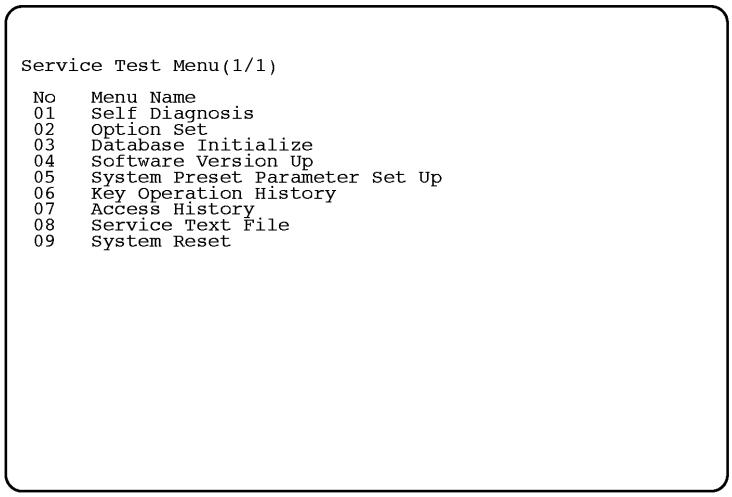
<Control> + F To go next page
<Control> + B To go previous page
<Control> + R To go previous Menu or interrupt the running test

Procedure 1

Follow these steps to enter the Service Menu.

1. Pressing the <Shift> key and then press the <Control>,<S>, and then <!> keys.
2. Input the PASSWORD.
3. Press the <Return> key.
4. Input the Employee Number or type the Employee Name.
5. Press the <Return> key.

   The Service Menu will appear on the CRT monitor as shown in ILLUSTRATION 2–6.



SERVICE TEST MENU
ILLUSTRATION 2–6

Procedure 2

Follow this step to exit the Service Menu.

1. Press and hold the <Control> key and then press the <R> key when the Service Menu is displayed. The Service Menu will be exited. If this step will be performed again, the Service Menu will be entered again.

Note

Reset the system using the System Reset, Item Number 9, to exit the Service Menu. Resetting the system using the System Reset, Item Number 9, does not affect on the system presets.

2–4–1 Self Diagnosis

Procedure 1

Follow this step to enter the Self Diagnosis Menu

1. Type **1** and then press **Enter** key when the Service Menu is displayed. Refer to the ILLUSTRATION 2–6. The Service Diagnosis Menu will appear on the CRT monitor screen as shown in the ILLUSTRATION 2–7.

```
Service Diagnosis Menu(1/2)

Category        FRU      Time Test Name
System     01            30M  System Test1(Reduced)
           02            60M  System Test2(Full)
Analog     03   Probe     5M  Beam Former Test1
           04   HBFR      1M  Beam Former Test2
           05   ASPR     10M  Log Test
           06   ASPR      5M  Frequency Characteristic Test
Probe      07   Probe     1M  Transducer Test
Doppler    08   ASPR      5M  Doppler Test1
           09   DOPC      1M  Doppler Test2
           10   VIDO      0M  Doppler Audio Test
CFM        11   ASPR      1M  Color Flow Test1
           12   DOPC      0M  Color Flow Test2
Digital    13 TLMC/TDCB  10M  Time Line Memory Test
           14 DSCC/TDCB   1M  Scan Converter Memory Test
           15 TLMC/TDCB   5M  CINE Memory Test
           16 VIDO/VIDM   1M  Video Memory Test
           17   VIPB      1M  VCR Playback Memory Test
           18   MASC      0M  Graphic Memory Test
           19   BMRC      0M  BMRC Memory Test

Enter Menu Number =_
```

```
Service Diagnosis Menu(2/2)

Category        FRU      Time Test Name
Physio     20   PIOP      1M  PIOP Interface Test
           21   KBD       0M  Keyboard RAM Test
           22   KBD       0M  Keyboard LED Test
           23   KBD       0M  Keyboard Menu Display Test
           24   KBD       0M  Keyboard Key Switch Test
           25   KBD       0M  Trackball & Encoder Test
           26   KBD       0M  Analog TGC Test
PSHV       27   PSHV      0M  Power Supply & Thermal Test
           28             0M  Operating Time Test
           29             0M  B Mode Noise Floor Test
           30             0M  D Mode Noise Floor Test
           31             0M  CFM Mode Noise Floor Test
           32             1M  Doppler Calibration
           33             0M  DCWD Mode Noise Floor Test
           34   Probe     1M  Transducer Test2

Enter Menu Number =_
```

SERVICE DIAGNOSIS MENU
ILLUSTRATION 2–7

2–4–1 Self Diagnosis (Continued)

Procedure 2

Follow this step to exit Self Diagnosis Menu.

1. Press and hold the **Control** key and then press the **R** key.
   The Self Diagnosis Menu will be exited and the Service Menu will be displayed again.

Procedure 3

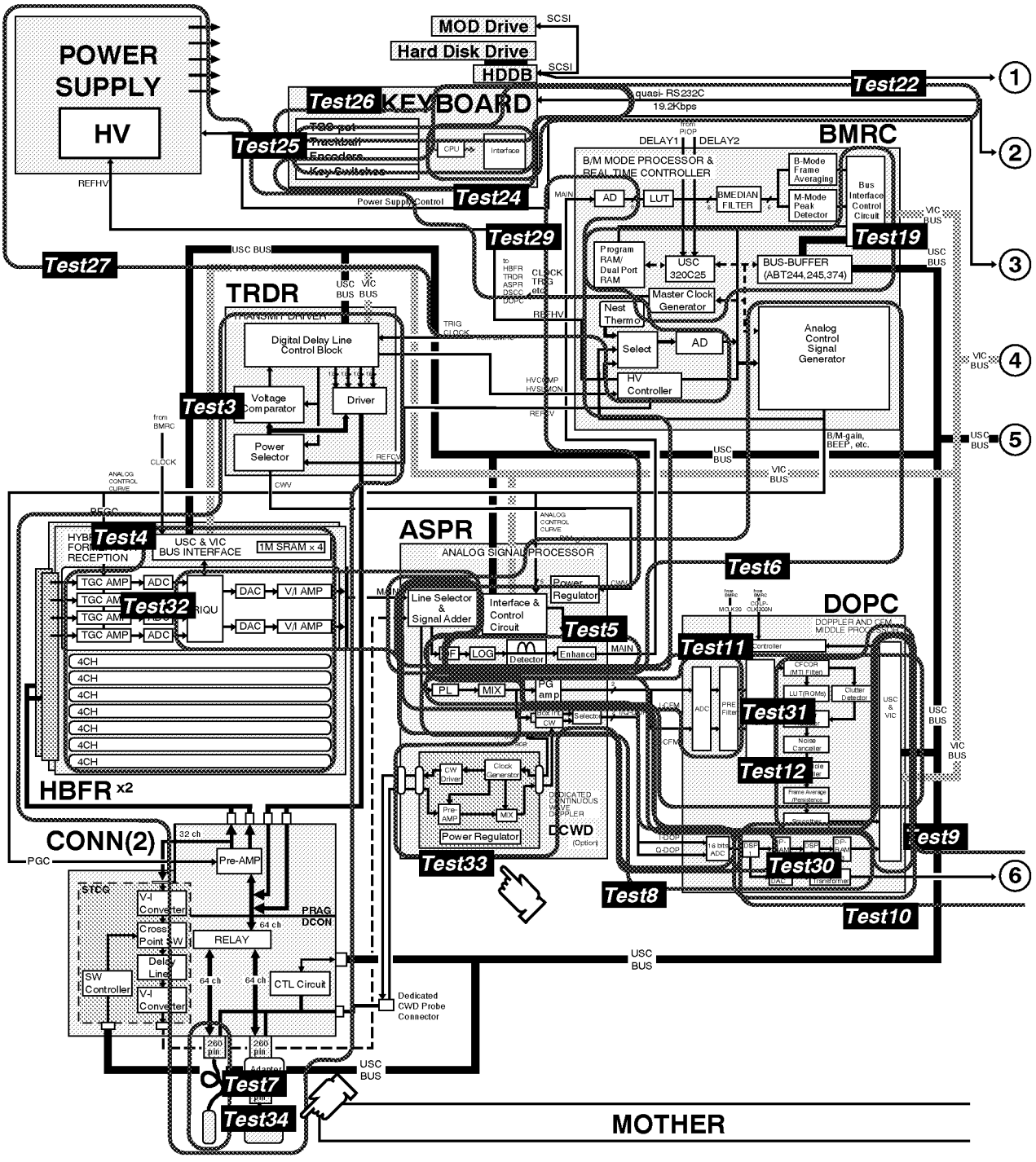
Follow this step to execute each test in the Self Diagnosis Menu.

1. Type the number of the desired test and then press the **Return** key.

Refer to each section to perform the each test for Self Diagnosis.

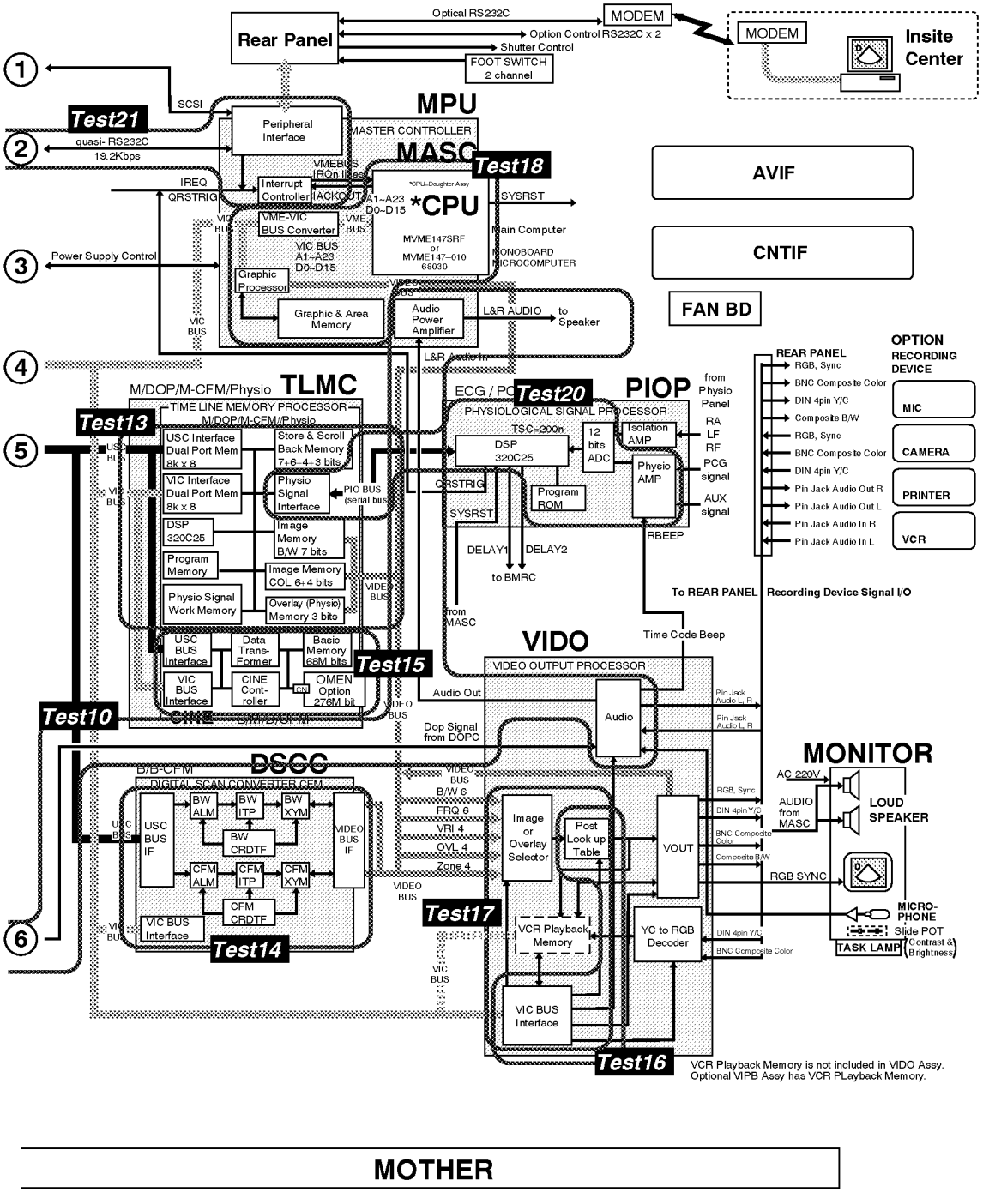
TEST NUMBER	TEST NAME	NOTE
01	SYSTEM TEST1 (Reduced)	
02	SYSTEM TEST 2 (Full)	
03	BEAM FORMER TEST 1	
04	BEAM FORMER TEST 2	
05	LOG TEST	
06	FREQUENCY CHARACTERISTIC TEST	
07	TRANSDUCER TEST	
08	DOPPLER TEST 1	Not available on B/W monitor console
09	DOPPLER TEST 2	Not available on B/W monitor console
10	DOPPLER AUDIO TEST	Not available on B/W monitor console
11	COLOR FLOW TEST 1	Not available on B/W monitor console
12	COLOR FLOW TEST 2	Not available on B/W monitor console
13	TIME LINE MEMORY TEST	
14	SCAN CONVERTER MEMORY TEST	
15	CINE MEMORY TEST	
16	VIDEO MEMORY TEST	
17	VCR PLAYBACK MEMORY TEST	Not available on B/W monitor console
18	GRAPHIC MEMORY TEST	
19	BMRC MEMORY TEST	
20	PIOP INTERFACE TEST	Not available on B/W monitor console
21	KEYBOARD RAM TEST	
22	KEYBOARD LED TEST	
23	KEYBOARD MENU DISPLAY TEST	Invalid for LOGIQ™ 400
24	KEYBOARD KEY SWITCH TEST	
25	TRACKBALL AND ENCODER TEST	
26	ANALOG TGC TEST	
27	POWER SUPPLY & THERMAL TEST	
28	OPERATING TIME TEST	
29	B MODE NOISE FLOOR TEST	
30	D MODE NOISE FLOOR TEST	Not available on B/W monitor console
31	CFM MODE NOISE FLOOR TEST	Not available on B/W monitor console
32	DOPPLER CALIBRATION	Not available on B/W monitor console
33	DCWD MODE NOISE FLOOR TEST	Not available on B/W monitor console Available on console with software version V3.10 or later
34	TRANSDUCER TEST 2	Available on console with software version V3.10 or later

2–4–1 Self Diagnosis (Continued)



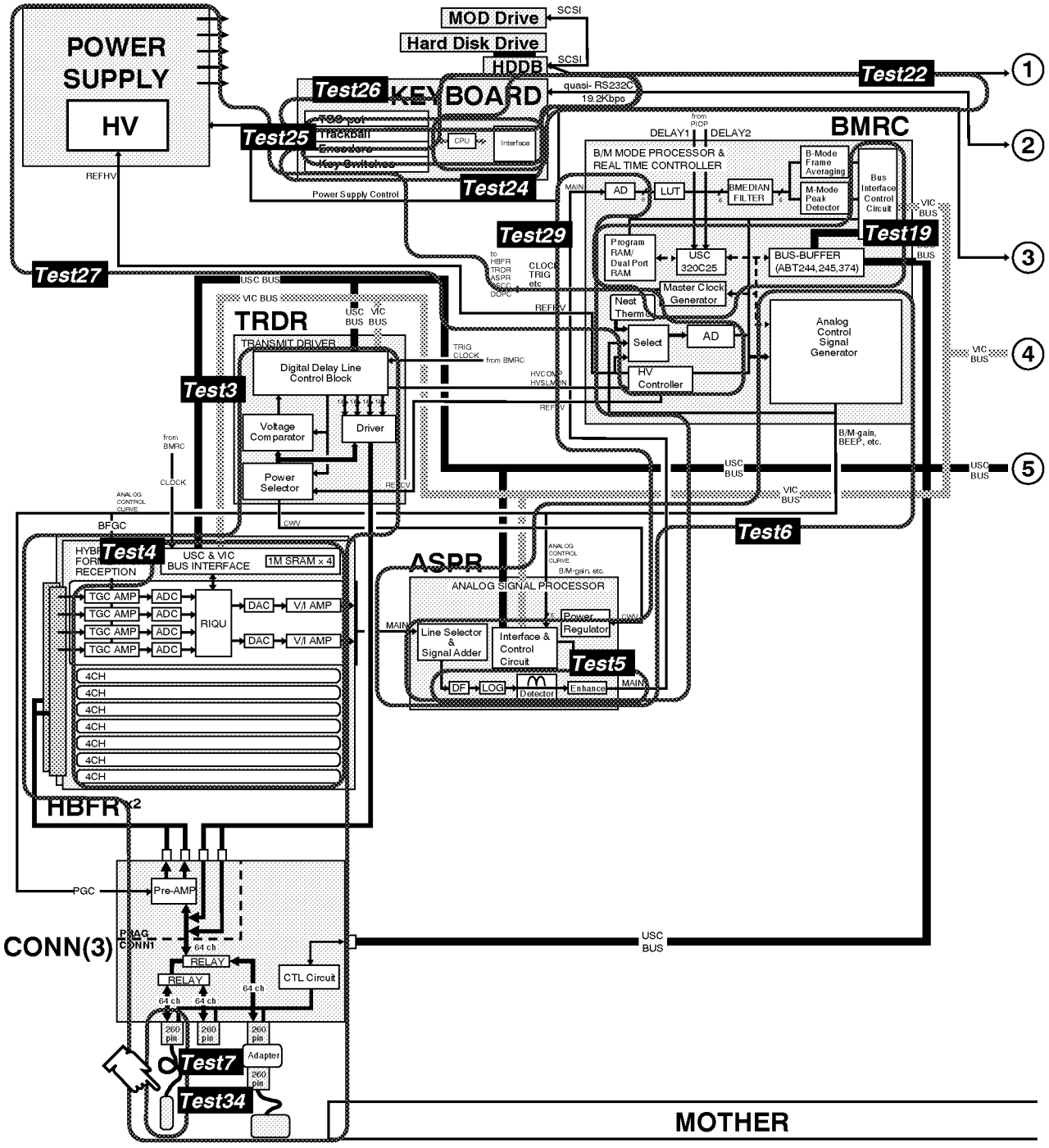
LOGIQ™ 400 (CFM MODEL) BLOCK DIAGRAM 1/2
ILLUSTRATION 2–8

2–4–1 Self Diagnosis (Continued)



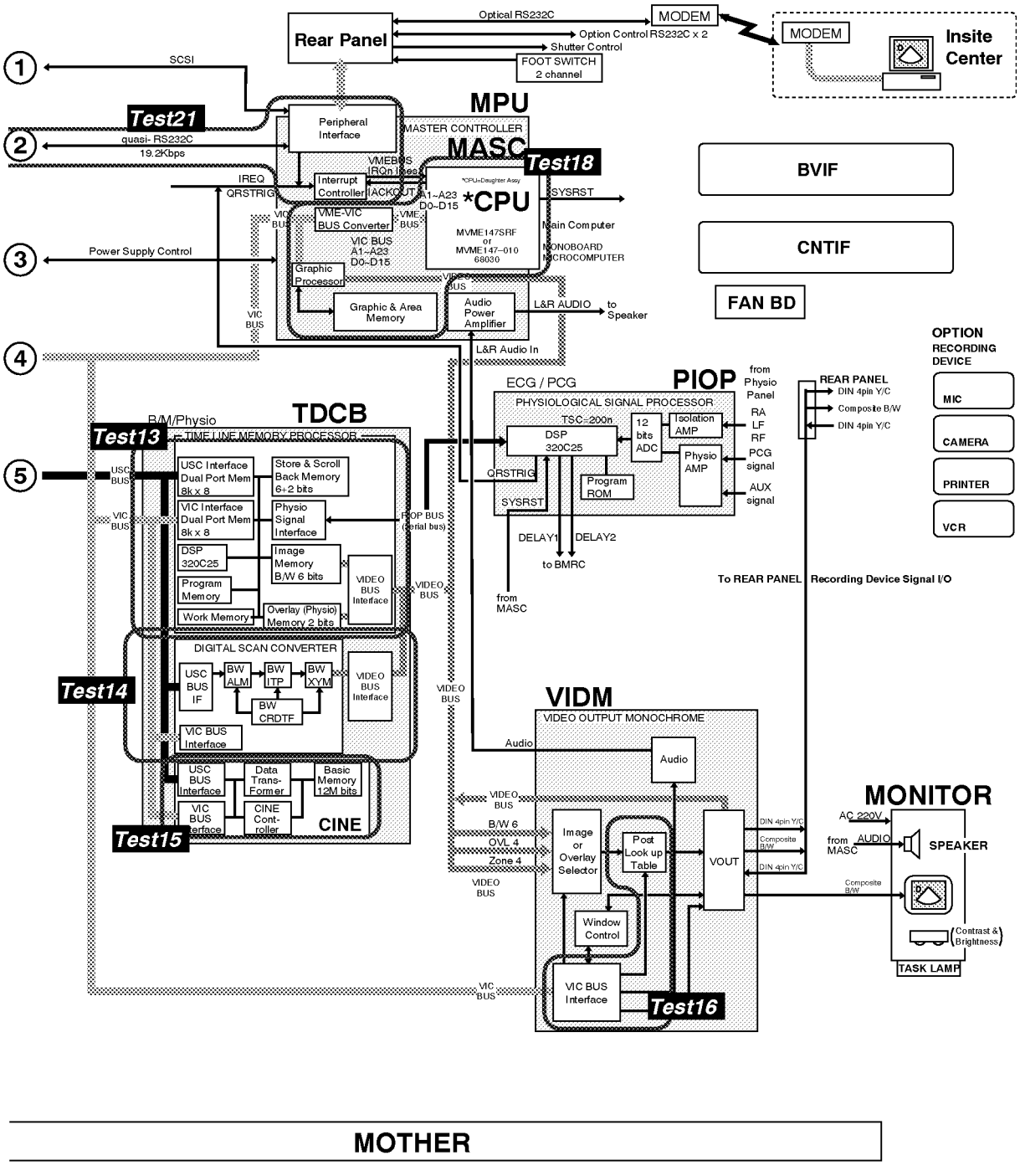
LOGIQ™ 400 (CFM MODEL) BLOCK DIAGRAM 2/2
ILLUSTRATION 2–9

2–4–1 Self Diagnosis (Continued)



LOGIQ™ 400 (B/W MODEL) BLOCK DIAGRAM 1/2
ILLUSTRATION 2–10

2–4–1 Self Diagnosis (Continued)



LOGIQ™ 400 (B/W MODEL) BLOCK DIAGRAM 2/2
ILLUSTRATION 2–11

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 1

TEST NAME

SYSTEM TEST (Reduced)

PURPOSE

To check the LOGIQ™ 400 system.

The memory test is performed partially to get the results quickly.

CRITERIA

No Error : The test must successfully complete without error.

DISPLAY FORMAT OF RESULTS

SYSTEM TEST (Reduced) Passed, or Failed

```
System Test(Reduced)(1/1)

 No Test Name                                    Status
 03 Beam Former Test1                            Not tested
 04 Beam Former Test2                            Not tested
 05 Log Test                                     Passed
 06 Frequency Characteristic Test                Passed
 08 Doppler Test1                                Passed
 09 Doppler Test2                                Passed
 11 Color Flow Test1                             Passed
 12 Color Flow Test2                             Passed
 13 Time Line Memory Test(Reduced)       TLMC    Passed
 14 Scan Converter Memory Test(Reduced)  DSCC    Running
 15 CINE Memory Test(Reduced)            TLMC
 16 Video Memory Test(Reduced)           VIDO
 17 VCR Playback Memory Test(Reduced)
 18 Graphic Memory Test(Reduced)
 19 BMRC Memory Test(Reduced)
 20 PIOP Interface Test
 21 Keyboard RAM Test(Reduced)
 27 Power Supply & Thermal Test
 29 B Mode Noise Floor Test
 30 D Mode Noise Floor Test
 31 CFM Mode Noise Floor Test
```

SYSTEM TEST 1

ILLUSTRATION 2–12

If a board is not installed in the system, the message ”Ignored” will be displayed.

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2–4–1 Self Diagnosis (Continued)

TEST NUMBER 2

TEST NAME

SYSTEM TEST (Full)

PURPOSE

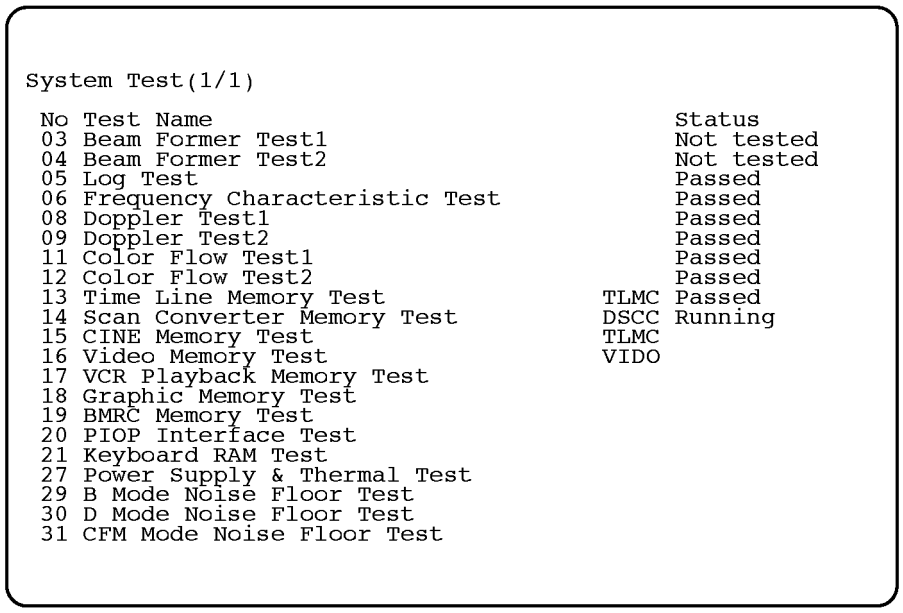
To check the LOGIQ™ 400 system.

CRITERIA

No Error : The test must successfully complete without error.

DISPLAY FORMAT OF RESULTS

SYSTEM TEST (Full) Passed, or Failed


System Test(1/1)
No Test Name Status
03 Beam Former Test1 Not tested
04 Beam Former Test2 Not tested
05 Log Test Passed
06 Frequency Characteristic Test Passed
08 Doppler Test1 Passed
09 Doppler Test2 Passed
11 Color Flow Test1 Passed
12 Color Flow Test2 Passed
13 Time Line Memory Test TLMC Passed
14 Scan Converter Memory Test DSCC Running
15 CINE Memory Test TLMC
16 Video Memory Test VIDO
17 VCR Playback Memory Test
18 Graphic Memory Test
19 BMRC Memory Test
20 PIOP Interface Test
21 Keyboard RAM Test
27 Power Supply & Thermal Test
29 B Mode Noise Floor Test
30 D Mode Noise Floor Test
31 CFM Mode Noise Floor Test

SYSTEM TEST 2
ILLUSTRATION 2–13

If a board is not installed in the system, the message ”Ignored” will be displayed.

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2–4–1 Self Diagnosis (Continued)

TEST NUMBER 3

TEST NAME

BEAM FORMER TEST 1

Note

This test is not available on the software version 2.00 console.

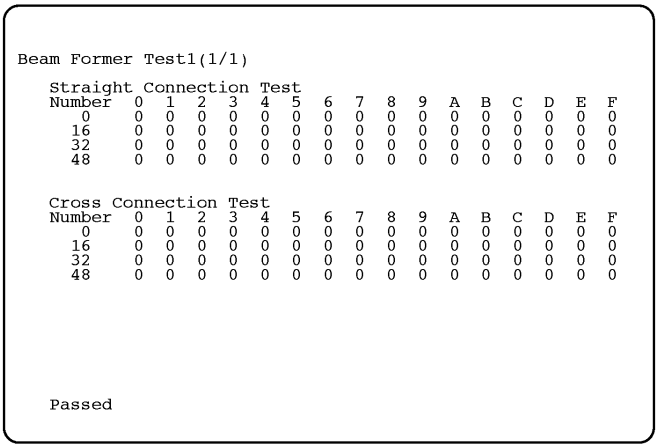
PURPOSE

The beam former consists of one TRDR Assy and two HBFR assemblies. The TRDR Assy has 64 transmit channels. Each HBFR Assy has 32 receive channels. This test checks all transmit and receive channels on the straight channel beam forming and cross channel beam forming. The test results of each channel will be displayed on the CRT monitor screen.

CRITERIA

0=passed, 1=failed

DISPLAY FORMAT OF RESULTS



BEAM FORMER TEST1 MENU
ILLUSTRATION 2–14

Action if the test fails

1. Replace HBFR assemblies from slot 2, 3 to slot 3, 2, connect another probe, and then perform this test again.
2. If the test is passed, replace the previous probe with new one. Otherwise, go to step 3.
3. If the different channel from the previous test result is failed, replace the HBFR Assy with new one according to the following:

Error Channel	Slot Number of HBFR Assy
0 – 31	slot 2
32 – 63	slot 3

   Otherwise, go to step 4.
4. If the same channel as the previous test result is failed, replace the TRDR Assy with new one and then perform this test again.
5. If the test is still failed, replace the CONN Assy.

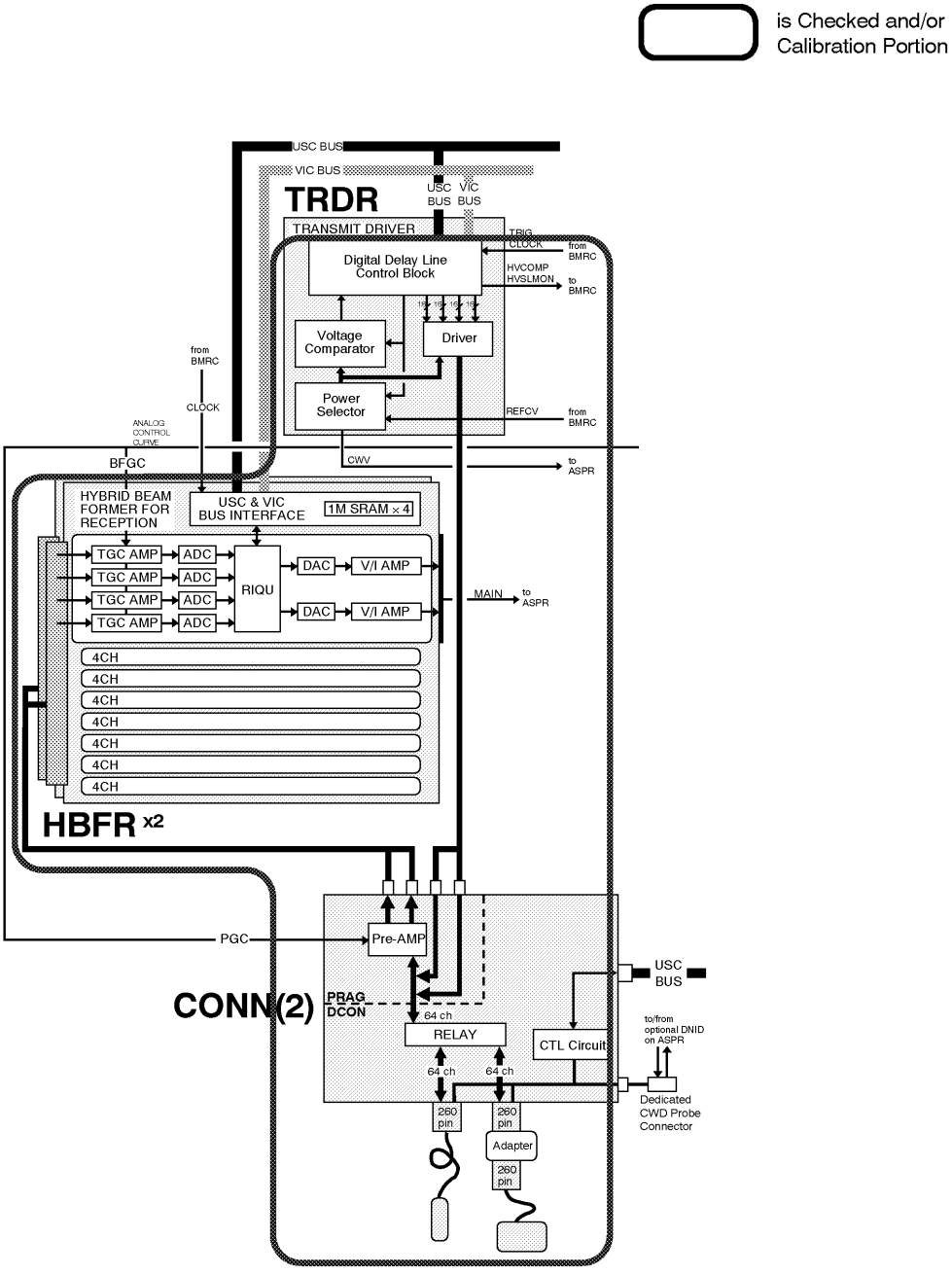
2–4–1 Self Diagnosis (Continued)

TEST NUMBER 3 (Continued)

The following Assemblies are necessary for this test

CFM model: PS, MPU, PROBE, CONN, TRDR, HBFR, BMRC, ASPR, DOPC, DSCC, VIDO (or VIPB), KB, MON

B/W model: PS, MPU, PROBE, CONN, TRDR, HBFR, BMRC, ASPR, VIDM, KB, MON



BEAM FORMER TEST1
ILLUSTRATION 2–15

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 4

TEST NAME

BEAM FORMER TEST 2

Note

This test is not available on the software version 2.00 console.

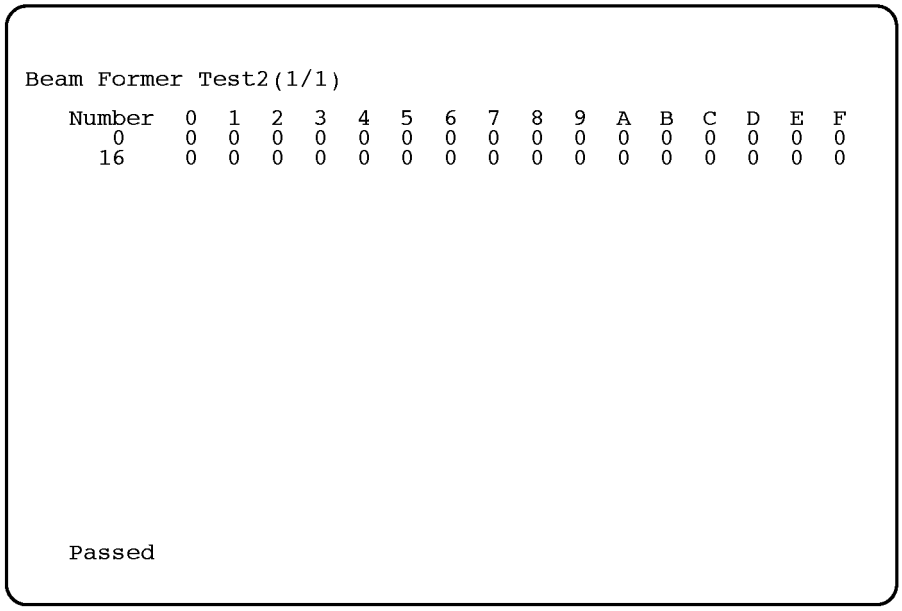
PURPOSE

To check all receiving channels of each HBFR Assy.

CRITERIA

0=passed, 1=failed

DISPLAY FORMAT OF RESULTS



BEAM FORMER TEST2 MENU
ILLUSTRATION 2–16

Action if the test fails

Replace HBFR Assy with new one according to the following:

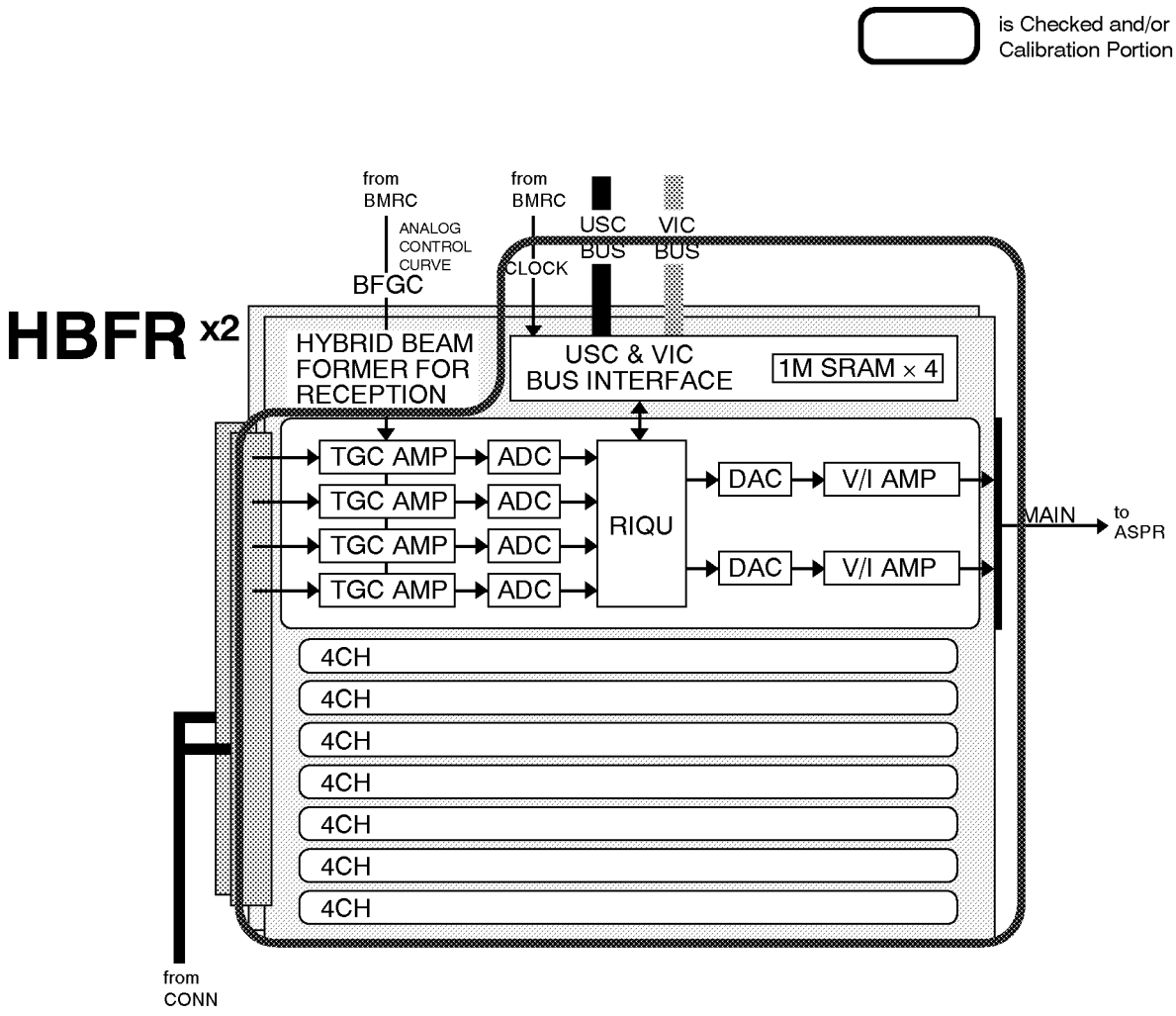
Error Channel	Slot Number of HBFR Assy
0 – 15	slot 2
16 – 31	slot 3

The following Assemblies are necessary for this test

CFM model: PS, MPU, TRDR, HBFR, BMRC, ASPR, DOPC, DSCC, VIDO (or VIPB), KB, MON
B/W model: PS, MPU, TRDR, HBFR, BMRC, ASPR, VIDM, KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 4 (Continued)



BEAM FORMER TEST2
ILLUSTRATION 2–17

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 5

TEST NAME

LOG TEST

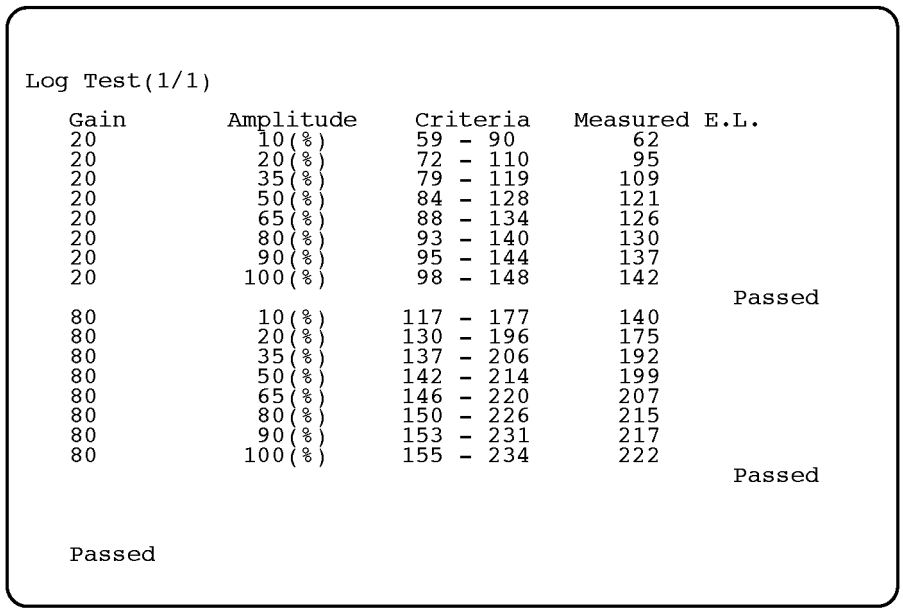
PURPOSE

To check the logarithmic linearity of ASPR Assy. It measures the echo level of the ASPR circuit. The test signal gains are 20dB and 80dB.

CRITERIA

Refer to criteria shown on the CRT monitor.

DISPLAY FORMAT OF RESULTS



LOG TEST MENU
ILLUSTRATION 2–18

Action if the test fails

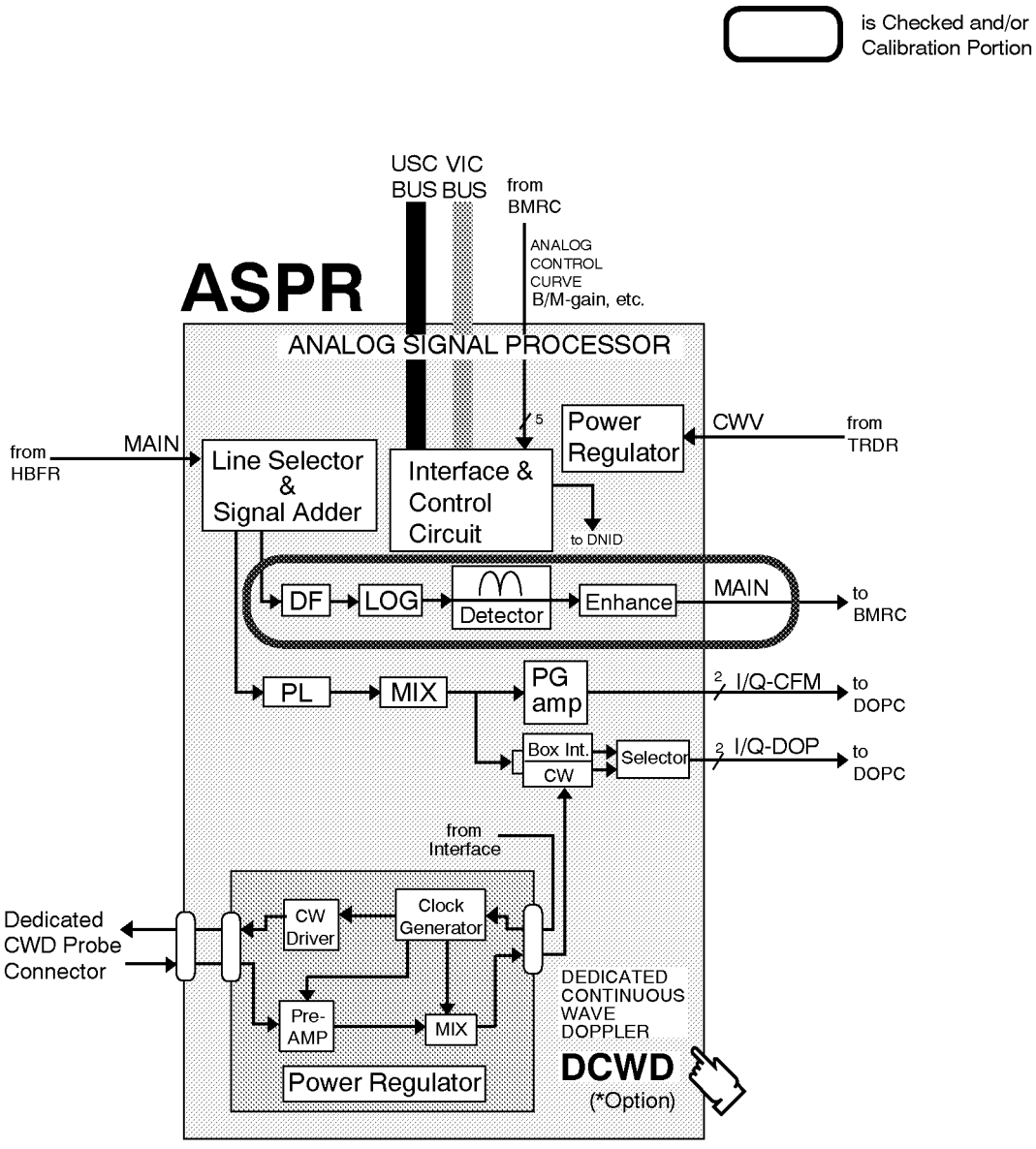
Replace the ASPR Assy.

The following Assemblies are necessary for this test

CFM model: PS, MPU, TRDR, HBFR, BMRC, ASPR, DOPC, DSCC, VIDO (or VIPB), KB, MON
B/W model: PS, MPU, TRDR, HBFR, BMRC, ASPR, VIDM, KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 5 (Continued)



LOG TEST
ILLUSTRATION 2–19

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 6

TEST NAME

FREQUENCY CHARACTERISTICS TEST

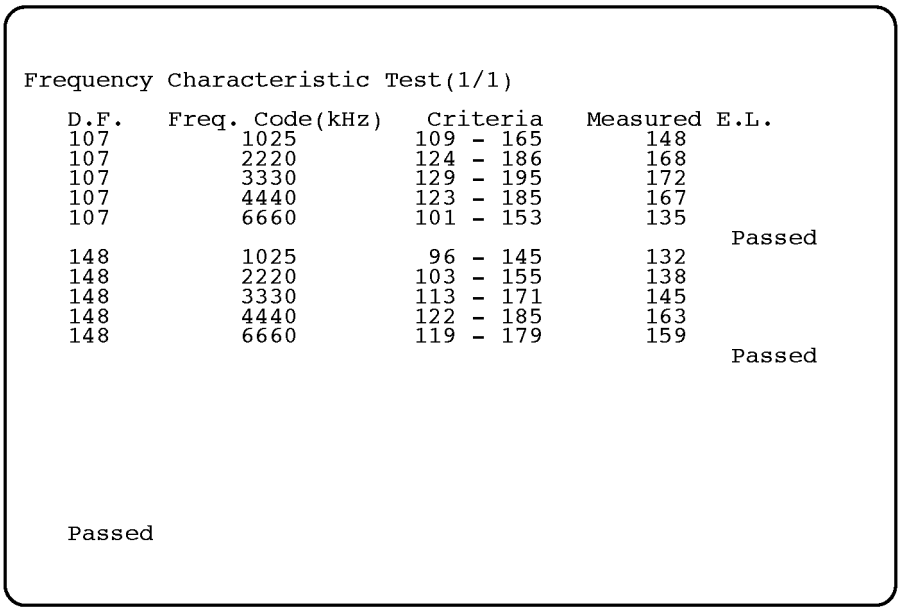
PURPOSE

To test the frequency characteristics so as to measure the echo level of several specified frequency signals.

CRITERIA

Refer to the criteria shown on the CRT monitor.

DISPLAY FORMAT OF RESULTS



FREQUENCY CHARACTERISTICS TEST MENU
ILLUSTRATION 2–20

Action if the test fails

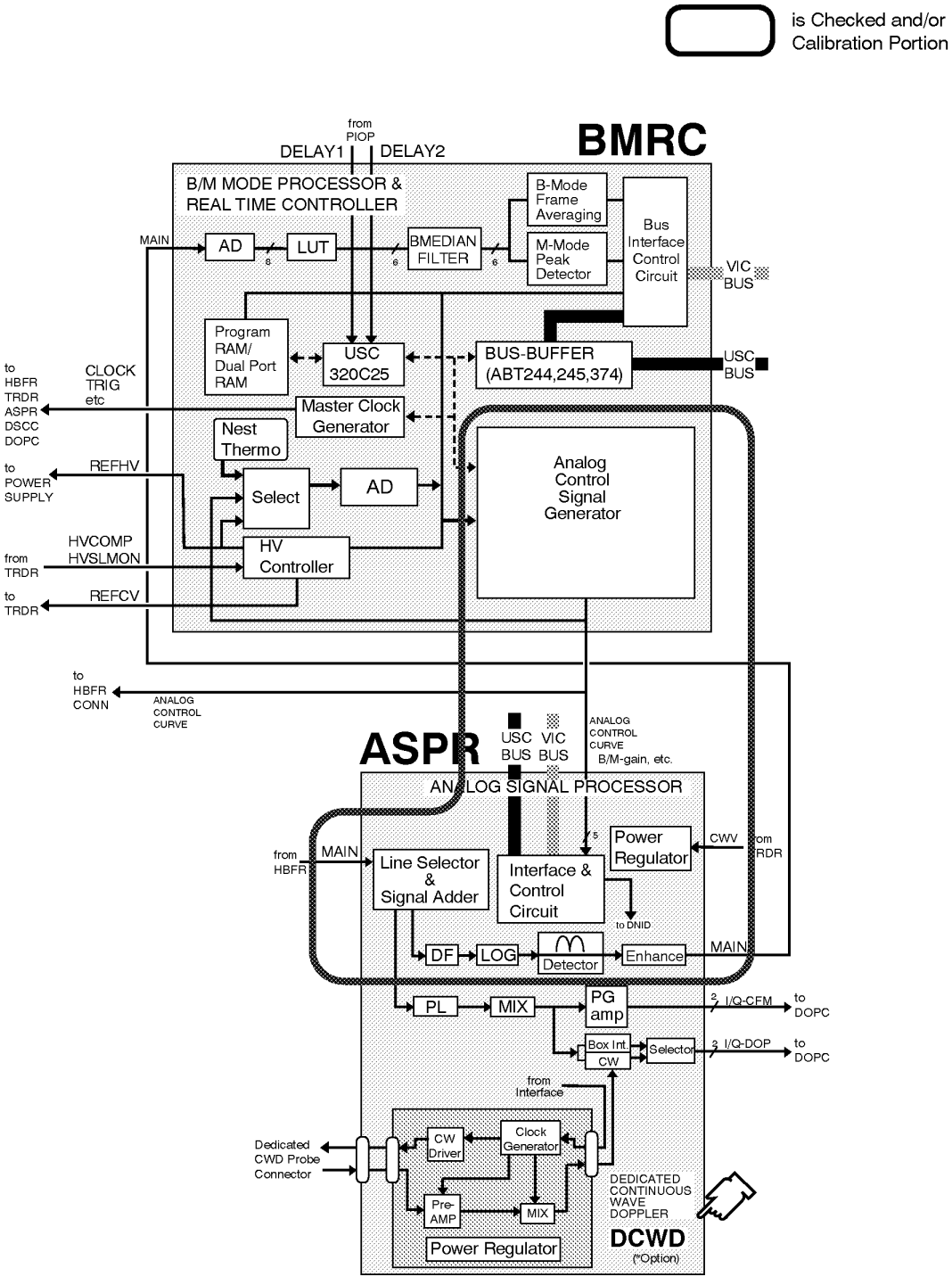
Change ASPR or BMRC Assy.

The following Assemblies are necessary for this test

CFM model: PS, MPU, TRDR, HBFR, DOPC, DSCC, VIDO (or VIPB), KB, MON
B/W model: PS, MPU, TRDR, HBFR, BMRC, ASPR, VIDM, KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 6 (Continued)



FREQUENCY CHARACTERISTICS TEST
ILLUSTRATION 2–21

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 7

TEST NAME

TRANSDUCER TEST

Note

This test is not available on the software version 2.00 console.

PURPOSE

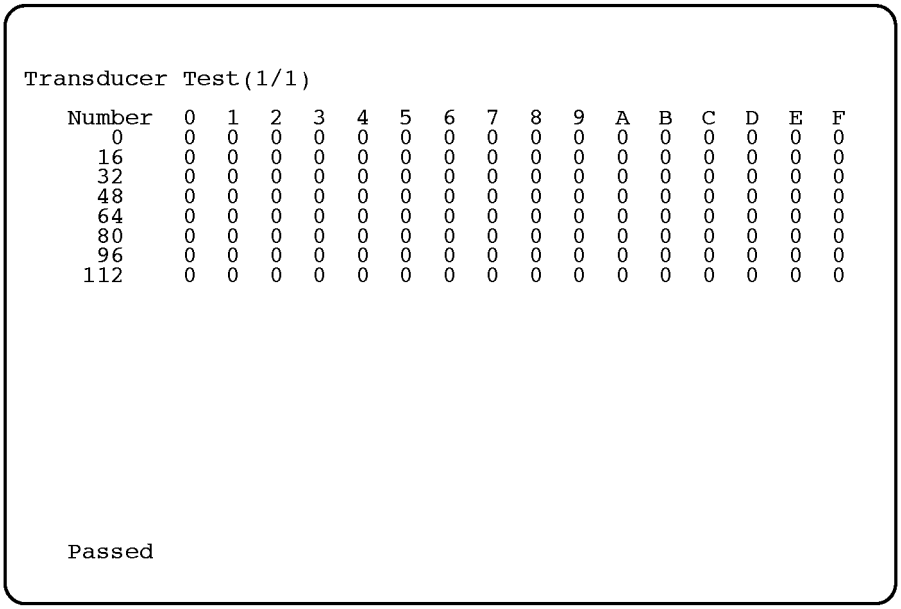
To test the probe connected with console. This can check the detective elements of probes.

CRITERIA

0=passed, 1=failed

DISPLAY FORMAT OF RESULTS

Depending on the probe connected, the number (indicating channels) can be different.



TRANSDUCER TEST MENU
ILLUSTRATION 2–22

Action if the test fails

1. Make sure that the probe is connected properly.
2. Perform this test again.
3. If failure still occur, Replace the probe.

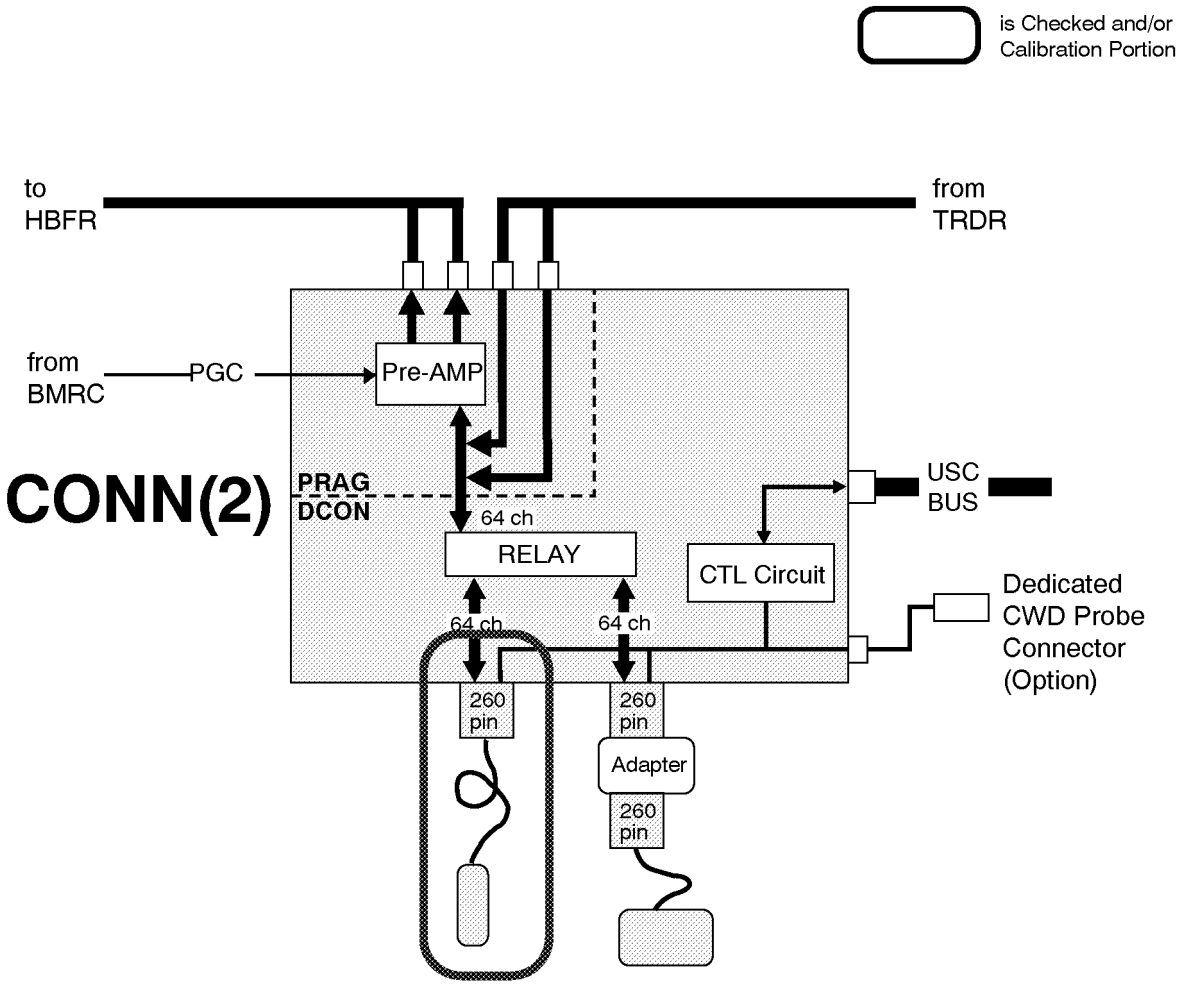
The following Assemblies are necessary for this test

CFM model: PS, MPU, PROBE, CONN, TRDR, HBFR, BMRC, ASPR, DOPC, DSCC, VIDO (or VIPB), KB, MON

B/W model: PS, MPU, PROBE, CONN, TRDR, HBFR, BMRC, ASPR, VIDM, KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 7 (Continued)



TRANSDUCER TEST
ILLUSTRATION 2–23

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 8

TEST NAME

DOPPLER TEST 1

PURPOSE

To test the doppler circuit of the ASPR and DOPC assemblies by transmitting a asynchronous test signal to the ASPR and DOPC assemblies and receiving a spectrum.

Note

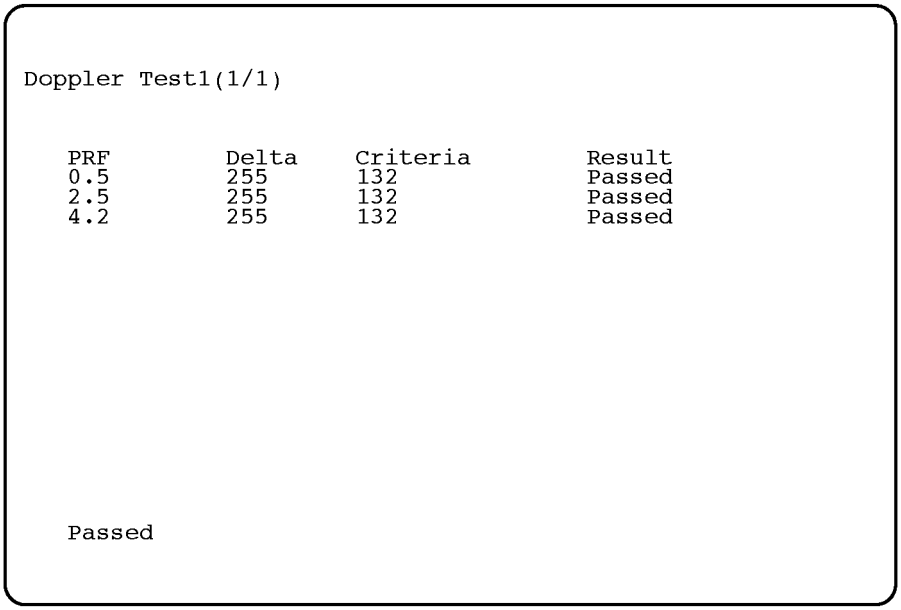
This test is invalid on the B/W monitor console.

CRITERIA

Delta should be higher than the criteria.

DISPLAY FORMAT OF RESULTS

Depending on the connected probe, the value of PRF can be different.



DOPPLER TEST 1 MENU
ILLUSTRATION 2–24

Action if the test fails

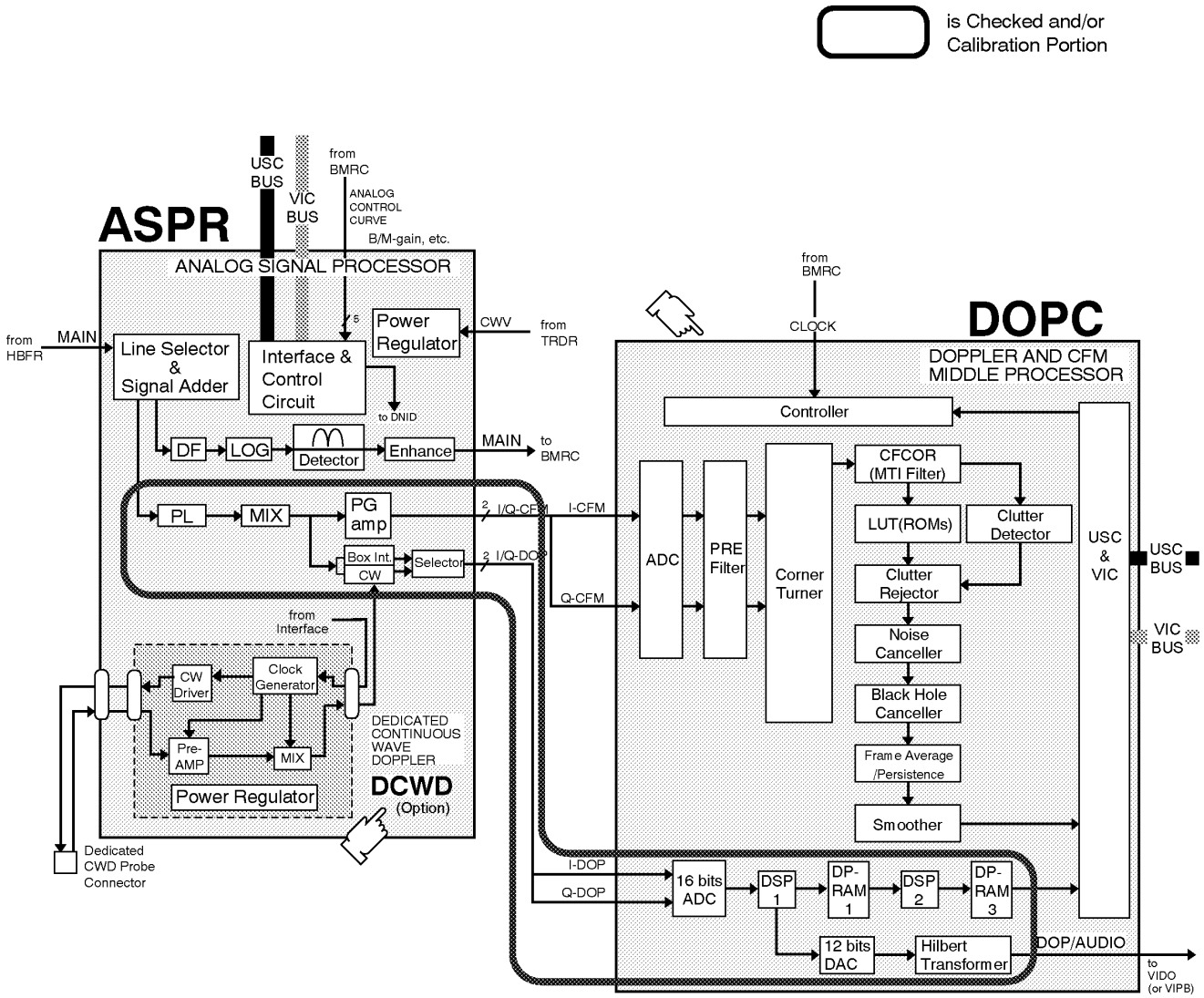
1. If all other tests passed or Color Flow Test1 failed, change ASPR Assy.
2. Perform Doppler Test 1 again.
3. If failure still occurs, change DOPC Assy.

The following Assemblies are necessary for this test

PS, MPU, TRDR, HBFR, BMRC, ASPR, DOPC, DSCC, VIPB (or VIDO), KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 8 (Continued)



DOPPLER TEST 1
ILLUSTRATION 2–25

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 9

TEST NAME

DOPPLER TEST 2

PURPOSE

To test the digital circuit for doppler of the DOPC Assy. This test checks a spectrum received by means that the DSP1 of DOPC Assy generates a test signal.

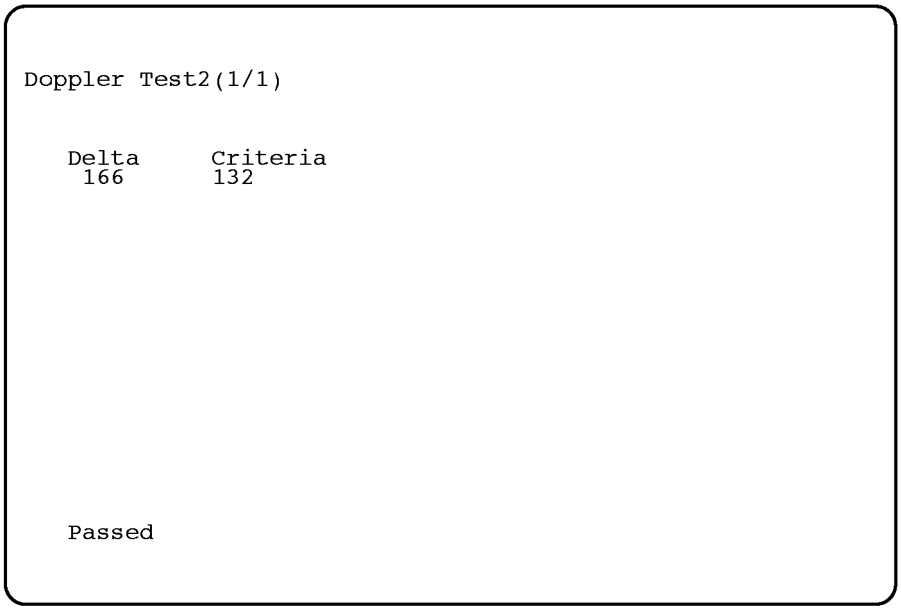
Note

This test is invalid on the B/W monitor console.

CRITERIA

Delta should be higher than the criteria.

DISPLAY FORMAT OF RESULTS



DOPPLER TEST 2 MENU
ILLUSTRATION 2–26

Action if the test failed

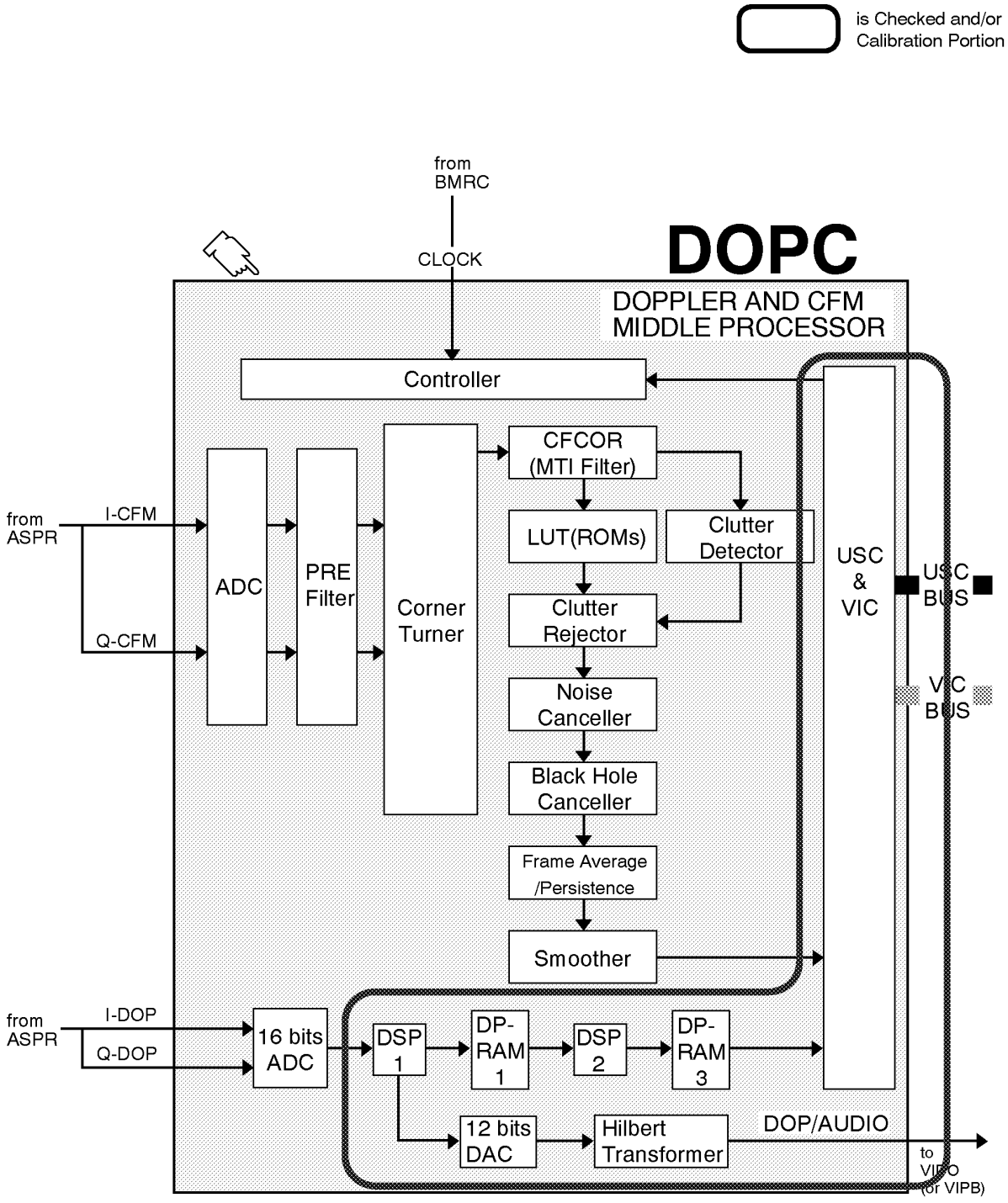
If all other tests passed, change DOPC Assy.

The following Assemblies are necessary for this test

PS, MPU, TRDR, HBFR, BMRC, ASPR, DOPC, DSCC, VIDO (or VIPB), KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 9 (Continued)



DOPPLER TEST 2
ILLUSTRATION 2–27

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 10

TEST NAME

DOPPLER AUDIO TEST

PURPOSE

To test the Hilbert Transformer on DOPC Assy and the audio circuit on VIDO (or VIPB) Assy. This test checks the sounds generated by the DSP1 on DOPC Assy.

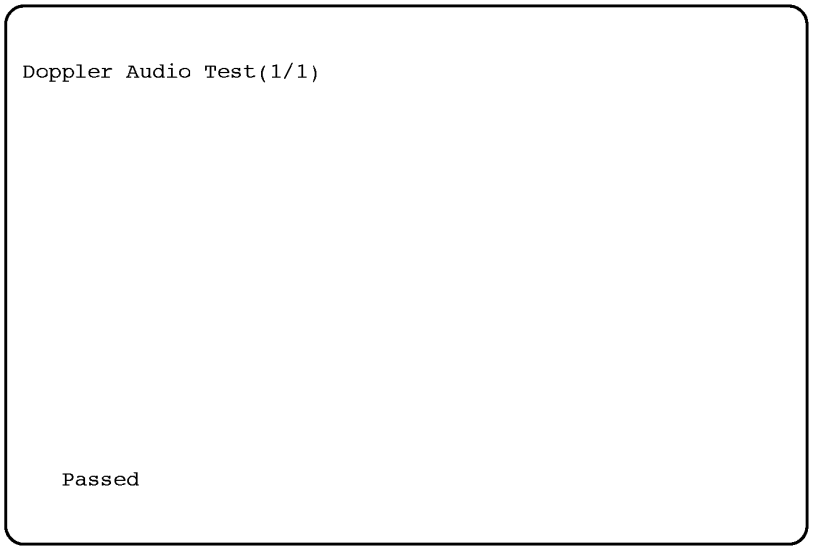
Note

This test is invalid on the B/W monitor console.

CRITERIA

To be able to hear the sound of test from loud speakers.

DISPLAY FORMAT OF RESULTS



DOPPLER AUDIO TEST MENU
ILLUSTRATION 2–28

Action if the test fails

Note

Rotate the Audio Volume knob during this test to check that the Audio Volume potentiometer functions properly. Replace the Keyboard if the Audio Volume potentiometer is out of order.

If there is no sound from both speakers, change DOPC Assy.

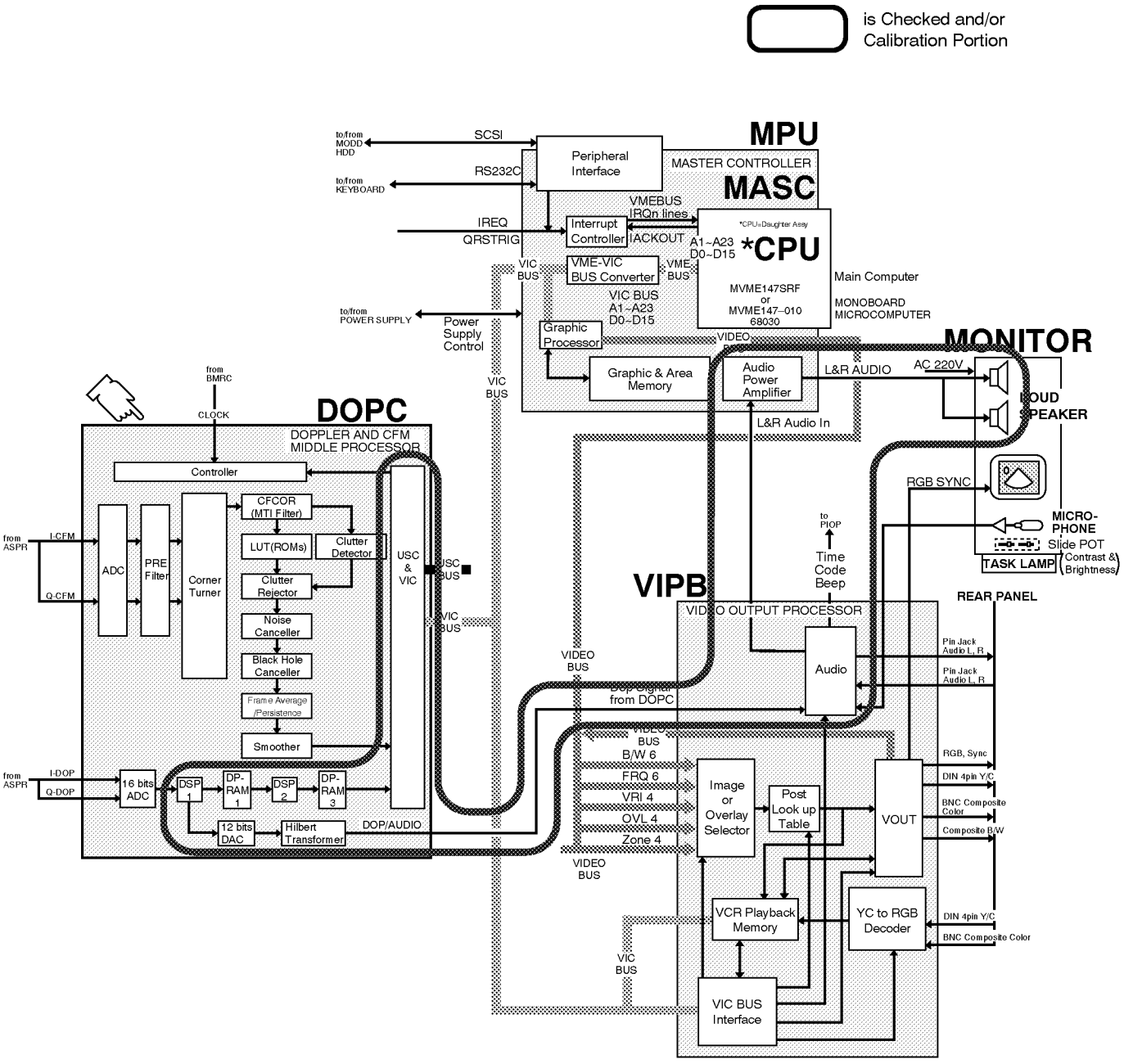
If there is no sound from only one speaker, left or right, exchange(switch) the speaker cable between left and right speakers. If speaker does not sound, change the speaker. If speaker which does not sound is different (switches), change MPU, and/or VIDO (VIPB) assemblies.

The following Assemblies are necessary for this test

PS, MPU, BMRC, DOPC, DSCC, VIDO (or VIPB), KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 10 (Continued)



DOPPLER AUDIO TEST
ILLUSTRATION 2–29

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 11

TEST NAME

COLOR FLOW TEST 1

PURPOSE

To test the mixing circuit of ASPR and DOPC assemblies by transmitting a asynchronous test signal to ASPR and receiving a color spectrum.

Note

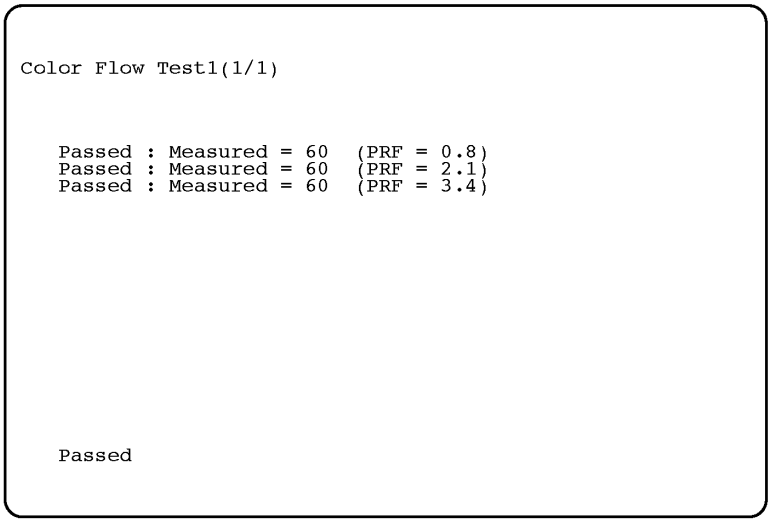
This test is invalid on the B/W monitor console.

CRITERIA

48 ≤ PRF Spectrum Code ≤ 73

DISPLAY FORMAT OF RESULTS

Depending on the connected probe, the value of PRF can be different.



COLOR FLOW TEST 1 MENU
ILLUSTRATION 2–30

Action if the test fails

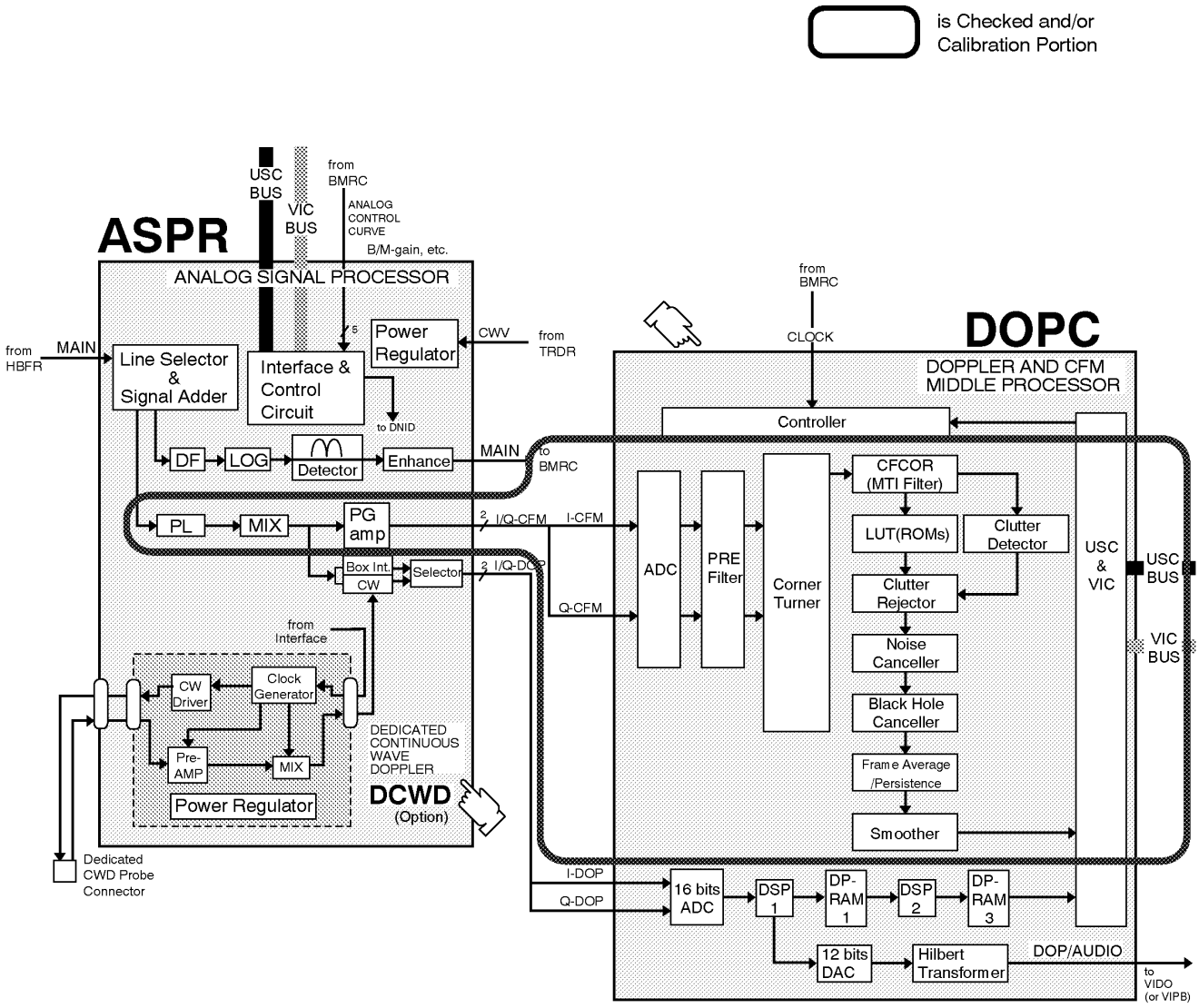
1. Change ASPR Assy.
2. Perform this test again.
3. If failure still occurs change DOPC Assy.

The following Assemblies are necessary for this test

PS, MPU, TRDR, HBFR, BMRC, ASPR, DOPC, DSCC, VIDO (or VIPB), KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 11 (Continued)



COLOR FLOW TEST 1
ILLUSTRATION 2–31

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 12

TEST NAME

COLOR FLOW TEST 2

PURPOSE

To test the DOPC Assy. The firmware and circuit of DOPC Assy are checked by displaying the specific color spectrum.

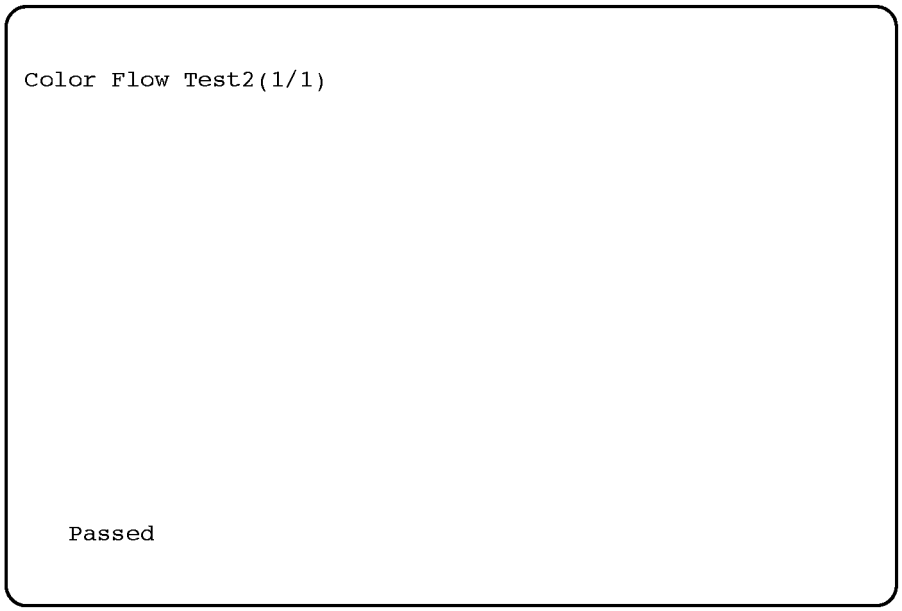
Note

This test is invalid on the B/W monitor console.

CRITERIA

No Error : The test must successfully complete without error.

DISPLAY FORMAT OF RESULTS



COLOR FLOW TEST 2 MENU
ILLUSTRATION 2–32

Action if the test fails

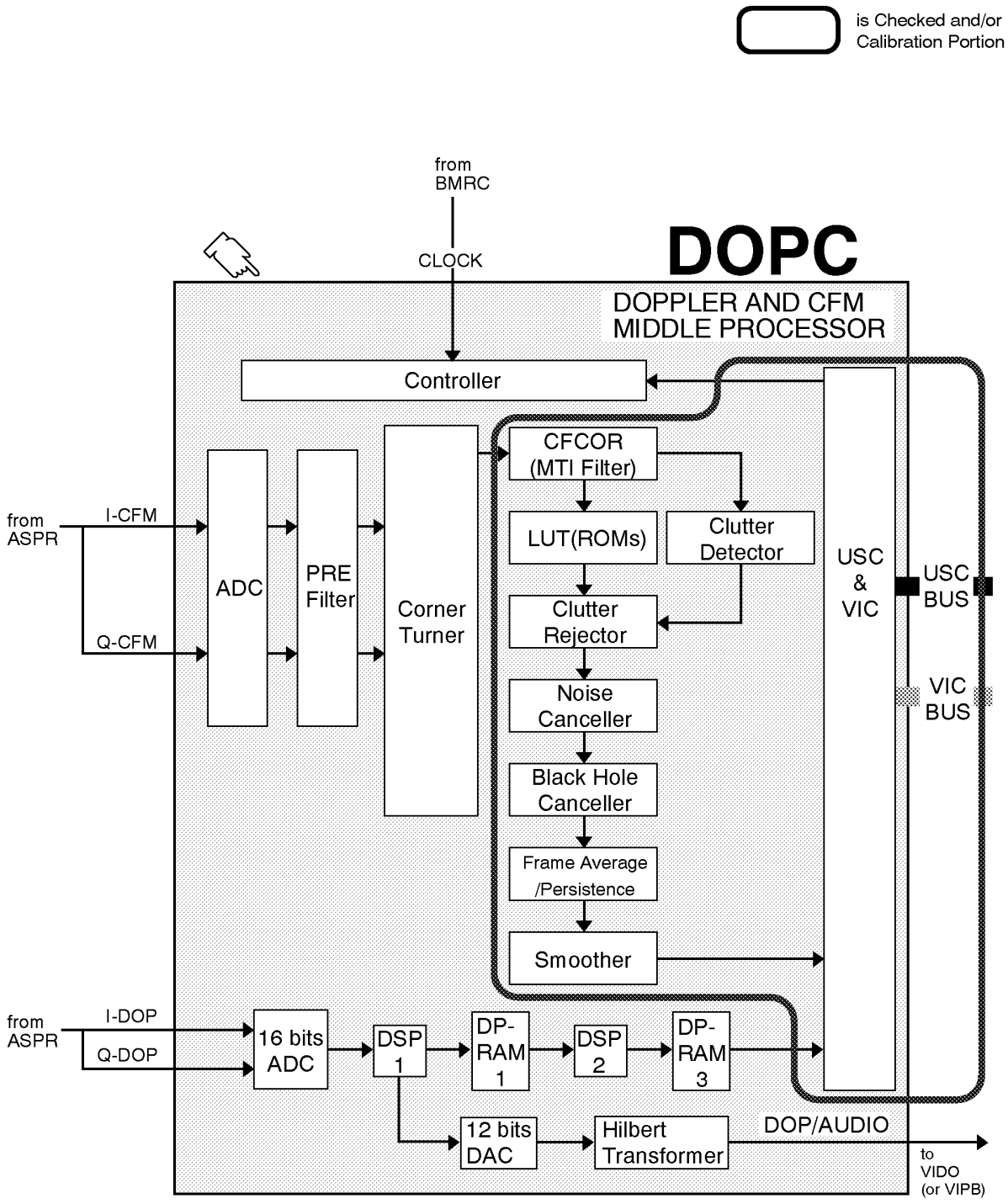
Change DOPC Assy.

The following Assemblies are necessary for this test

PS, MPU, BMRC, DSCC, DOPC, VIDO (or VIPB), KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 12 (Continued)



COLOR FLOW TEST 2
ILLUSTRATION 2–33

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 13

TEST NAME

TIME LINE MEMORY TEST

PURPOSE

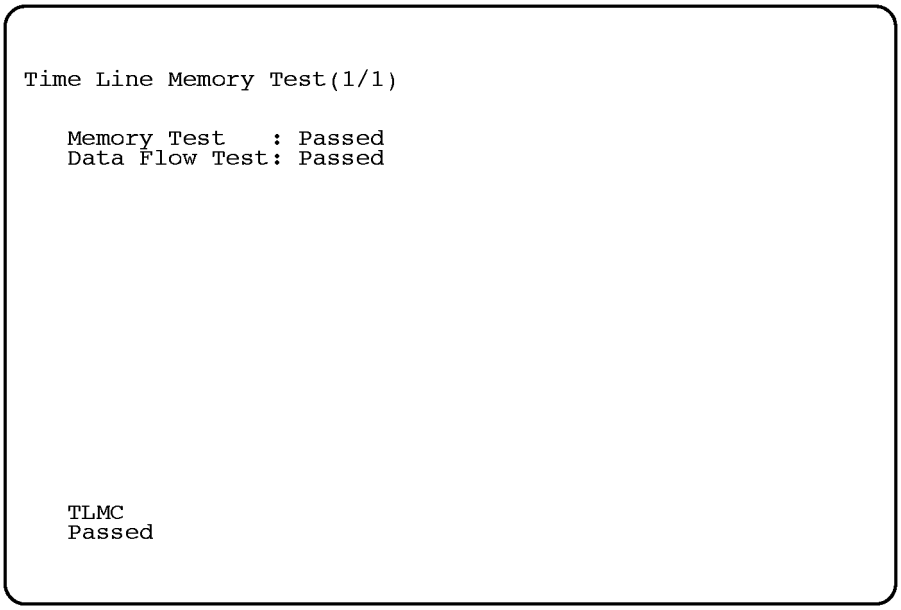
To test the TLMP block of TLMC Assy or TDCB Assy. The BMRC Assy sends data via the USC bus to the memory on TLMP block. The DSP of TLMP block reads transmitted data from the memory. Results is sent to Main Computer.

CRITERIA

No Error : The test must successfully complete without error.

DISPLAY FORMAT OF RESULTS

CFM model: TLMC Passed or TLMC Failed
B/W model: TDCB Passed or TDCB Failed



TIME LINE MEMORY TEST MENU
ILLUSTRATION 2–34

Action if the test fails

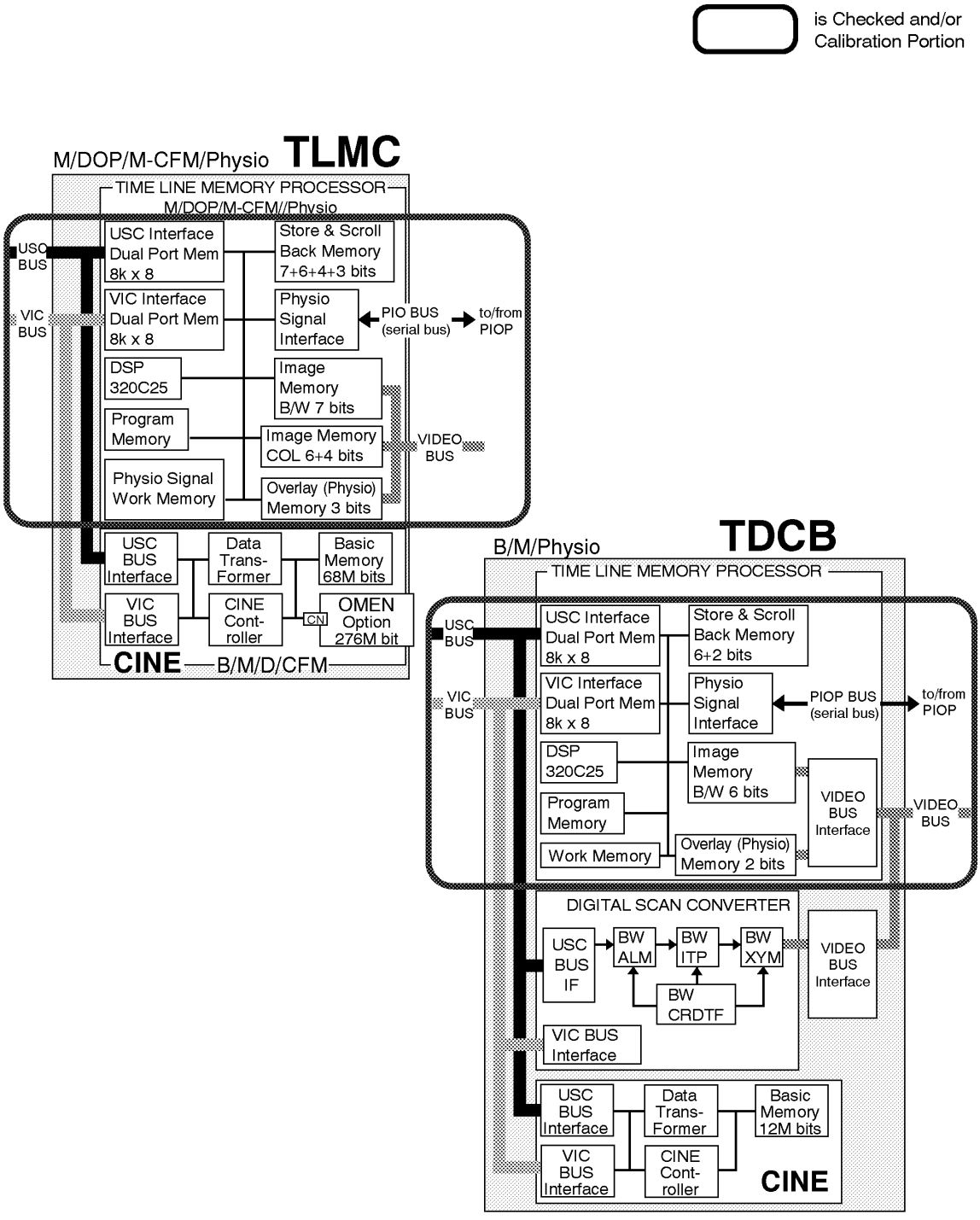
Change TLMC Assy or TDCB Assy.

The following Assemblies are necessary for this test

CFM model: PS, MPU, BMRC, ASPR, DOPC, DSCC, TLMC, VIDO (or VIPB), KB, MON
B/W model: PS, MPU, BMRC, ASPR, TDCB, VIDM, KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 13 (Continued)



TIME LINE MEMORY TEST
ILLUSTRATION 2–35

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 14

TEST NAME

SCAN CONVERTER MEMORY TEST

PURPOSE

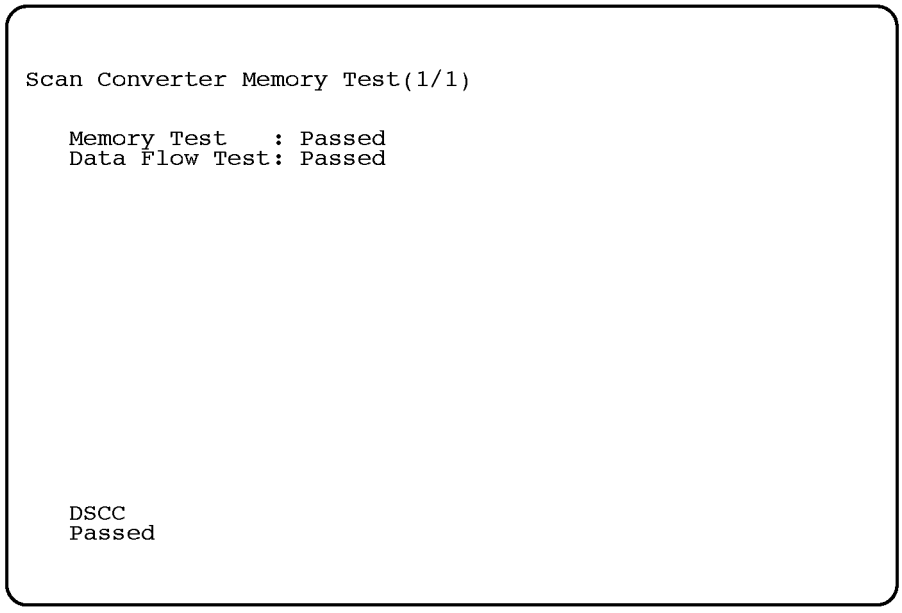
To test the RAM on DSCC Assy or TDCB Assy. The BMRC Assy sends data into the memory of DSCC Assy or TDCB Assy and the main computer reads memory to test the data flow.

CRITERIA

No Error : The test must successfully complete without error.

DISPLAY FORMAT OF RESULTS

CFM model: DSCC Passed or DSCC Failed
B/W model: TDCB Passed or TDCB Failed



SCAN CONVERTER MEMORY TEST MENU
ILLUSTRATION 2–36

Action if the test failed

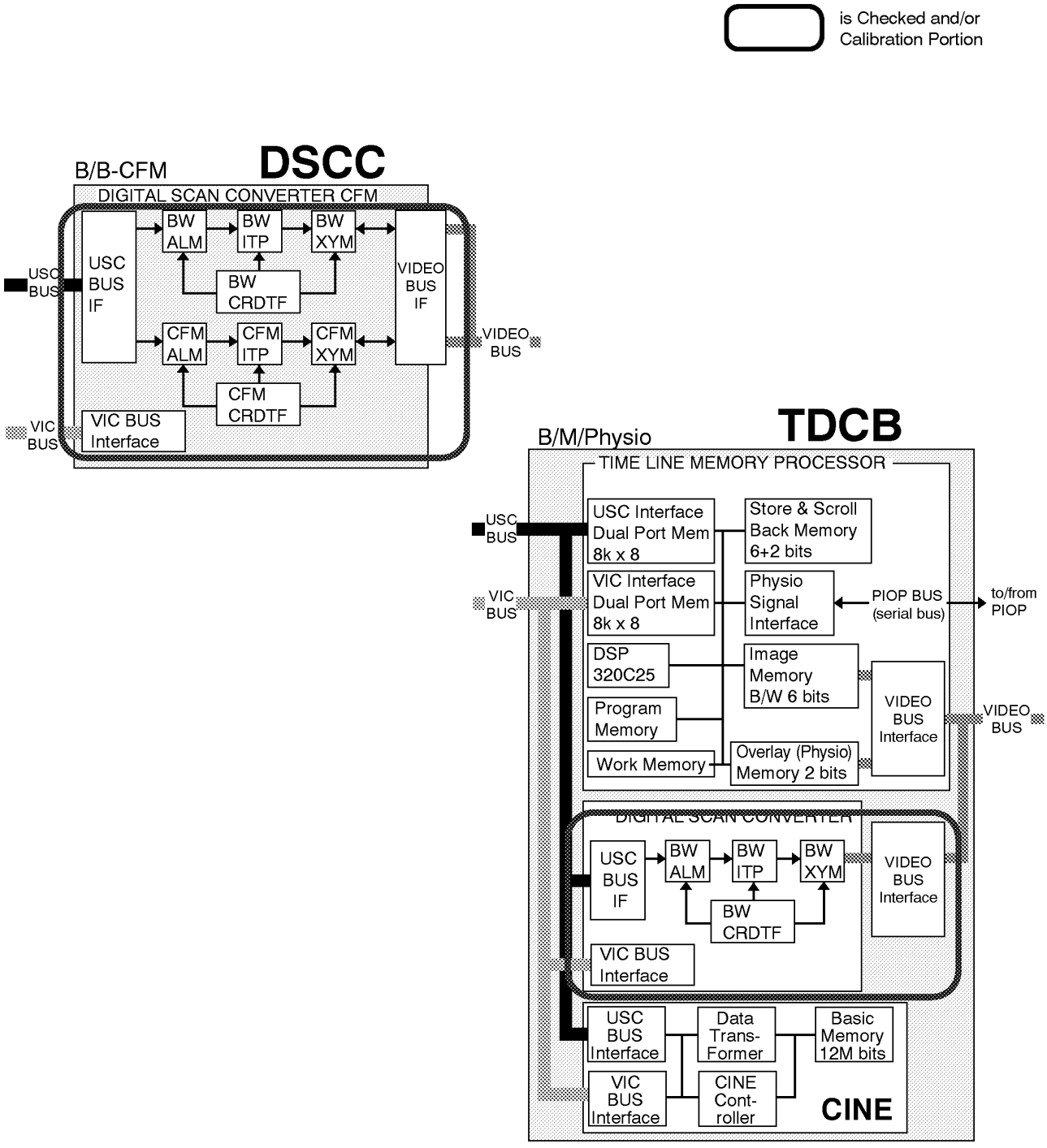
If all other tests passed, change DSCC Assy or TDCB Assy.

The following Assemblies are necessary for this test

CFM model: PS, MPU, BMRC, ASPR, DOPC, DSCC, VIDO (or VIPB), KB, MON
B/W model: PS, MPU, BMRC, ASPR, TDCB, VIDM, KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 14 (Continued)



SCAN CONVERTER MEMORY TEST
ILLUSTRATION 2–37

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 15

TEST NAME

CINE MEMORY TEST

PURPOSE

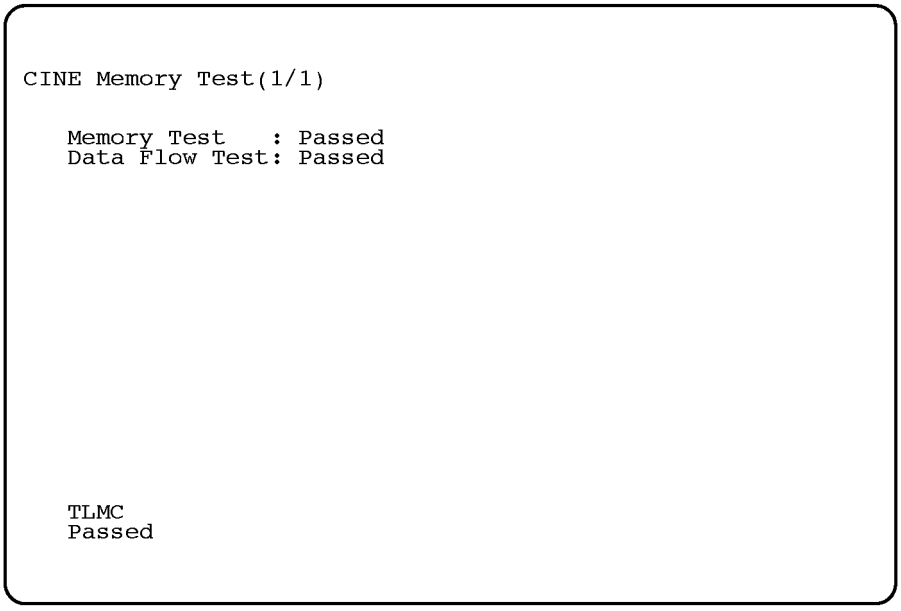
To test the CINE block on TLMC Assy or TDCB Assy. The BMRC Assy sends data into the memory of CINE block and the main computer reads memory to test the data flow.

CRITERIA

No Error : The test must successfully complete without error.

DISPLAY FORMAT OF RESULTS

CFM model: TLMC Passed or TLMC Failed
B/W model: TDCB Passed or TDCB Failed



CINE MEMORY TEST MENU
ILLUSTRATION 2–38

Action if the test fails

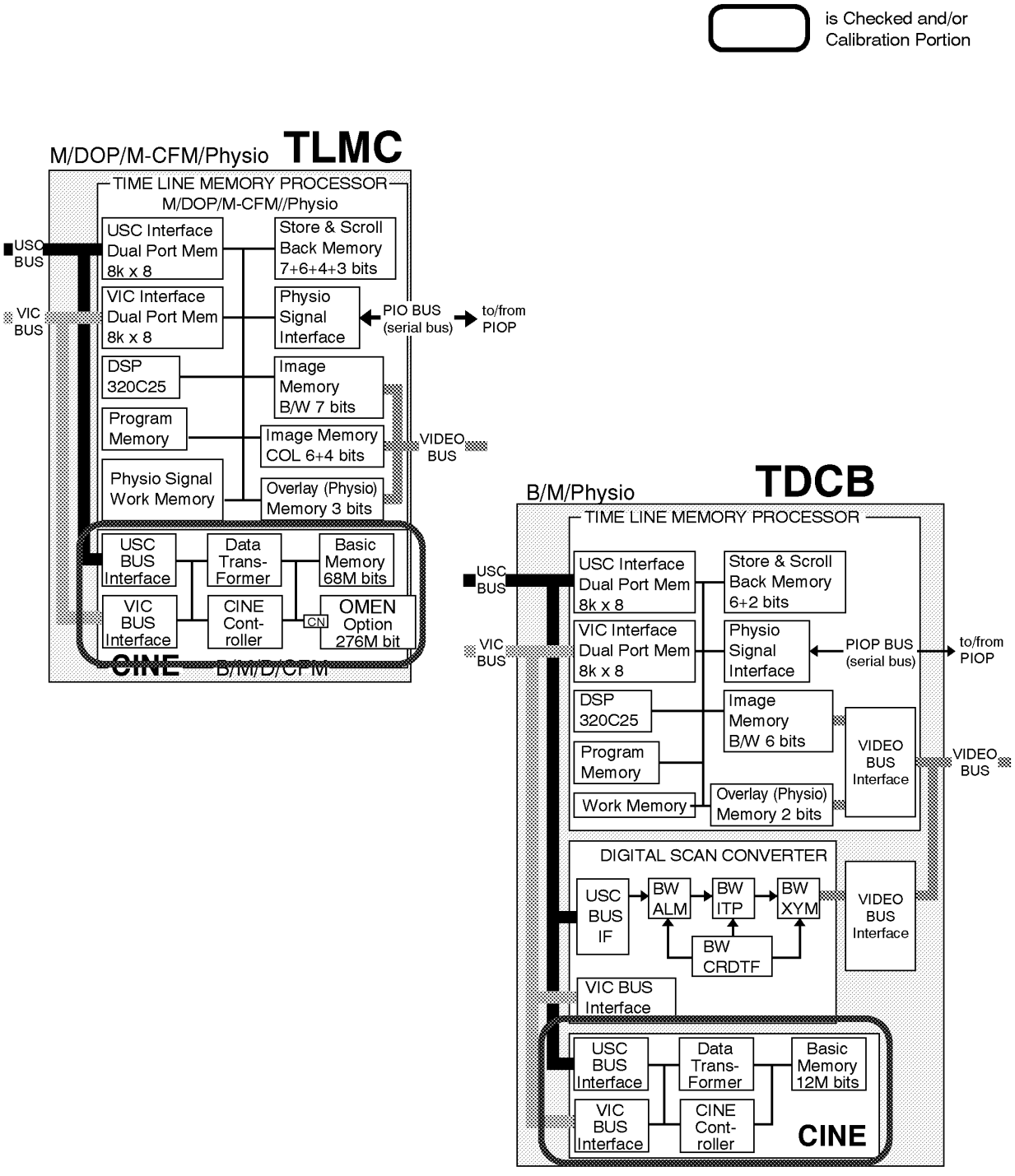
If other tests passed, change TLMC Assy or TDCB Assy.

The following Assemblies are necessary for this test

CFM model: PS, MPU, BMRC, DSCC, TLMC, VIDO (or VIPB), KB, MON
B/W model: PS, MPU, BMRC,TDCB, VIDM, KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 15 (Continued)



CINE MEMORY TEST
ILLUSTRATION 2–39

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 16

TEST NAME

VIDEO MEMORY TEST

PURPOSE

To test the VIDO Assy or VIDM Assy. The Main computer writes and reads data from the memory of Post Look up Table on VIDO Assy or VIDM Assy.

Note

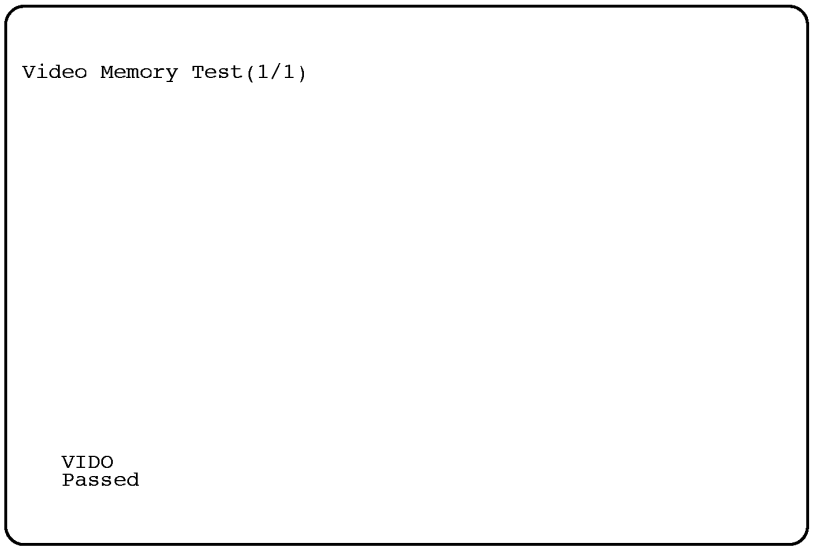
The message ”Ignore” is displayed on the CRT monitor when the VIPB Assy is installed in the console.

CRITERIA

No Error : The test must successfully complete without error.

DISPLAY FORMAT OF RESULTS

CFM model: VIDO Passed or VIDO Failed
B/W model: VIDM Passed or VIDM Failed



VIDEO MEMORY TEST MENU
ILLUSTRATION 2–40

Action if the test fails

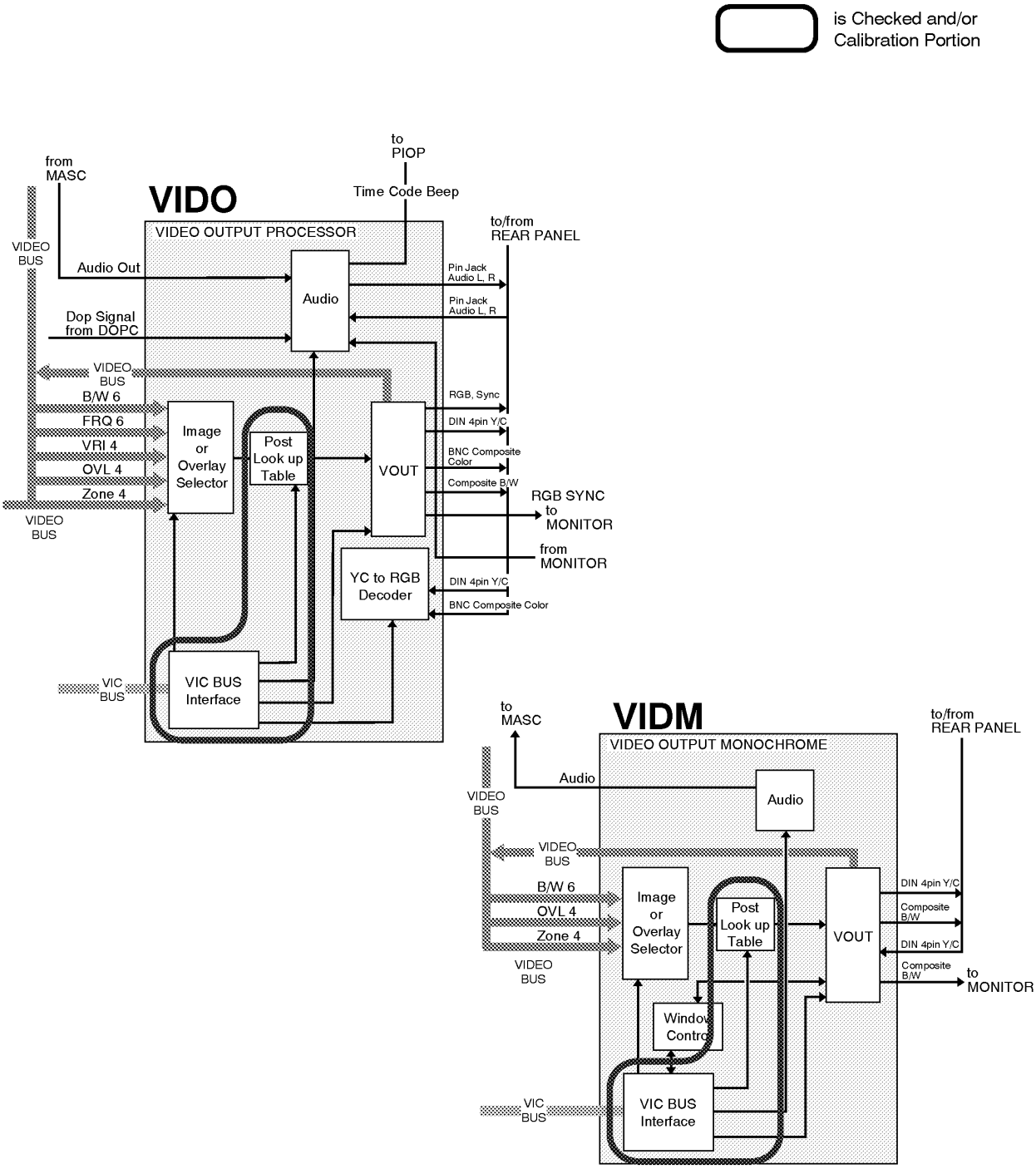
If other tests passed, change VIDO Assy or VIDM Assy.

The following Assemblies are necessary for this test

CFM model: PS, MPU, BMRC, VIDO, KB, MON
B/W model: PS, MPU, BMRC, VIDM, KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 16 (Continued)



VIDEO MEMORY TEST
ILLUSTRATION 2–41

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 17

TEST NAME

VCR PLAYBACK MEMORY TEST

PURPOSE

To test the VPBM block of VIPB Assy. The BMRC Assy sends data into the memory of DSCC Assy and the DDSC transfers data to VPBM block. The main computer reads the memory of VPBM block.

Note

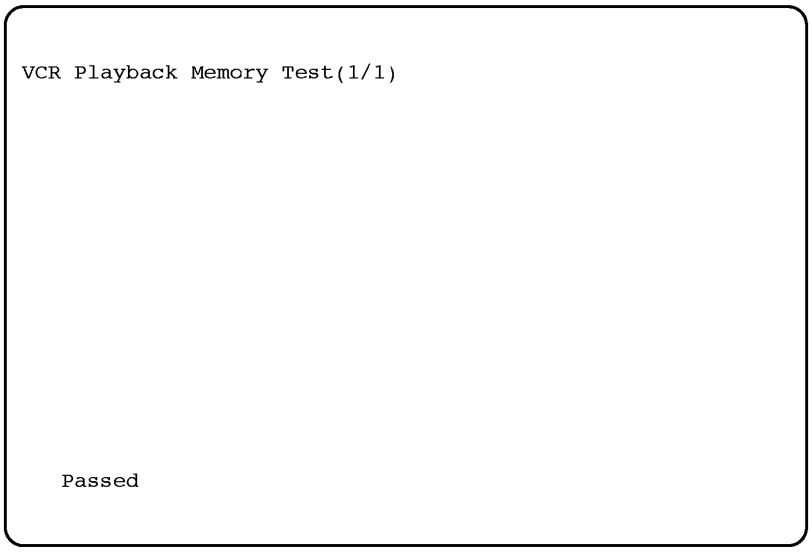
This test is invalid on the B/W monitor console.

CRITERIA

No Error : The test must successfully complete without error.

DISPLAY FORMAT OF RESULTS

Passed or Failed.



VCR PLAYBACK MEMORY TEST MENU
ILLUSTRATION 2–42

Action if the test fails

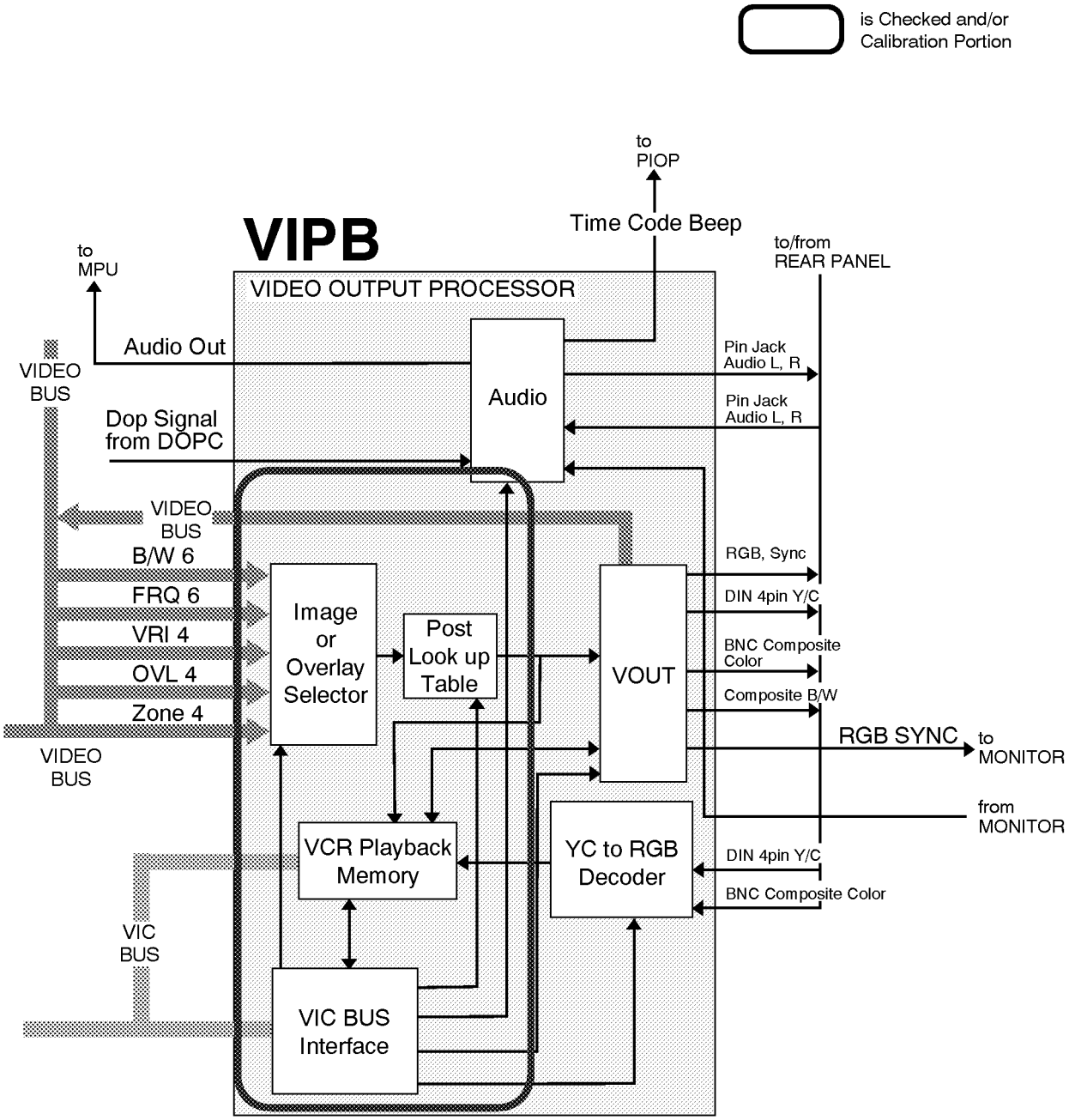
If other tests passed, change VIPB Assy.

The following Assemblies are necessary for this test

PS, MPU, BMRC, DSCC, VIPB, KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 17 (Continued)



VCR PLAYBACK MEMORY TEST
ILLUSTRATION 2–43

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 18

TEST NAME

GRAPHIC MEMORY TEST

PURPOSE

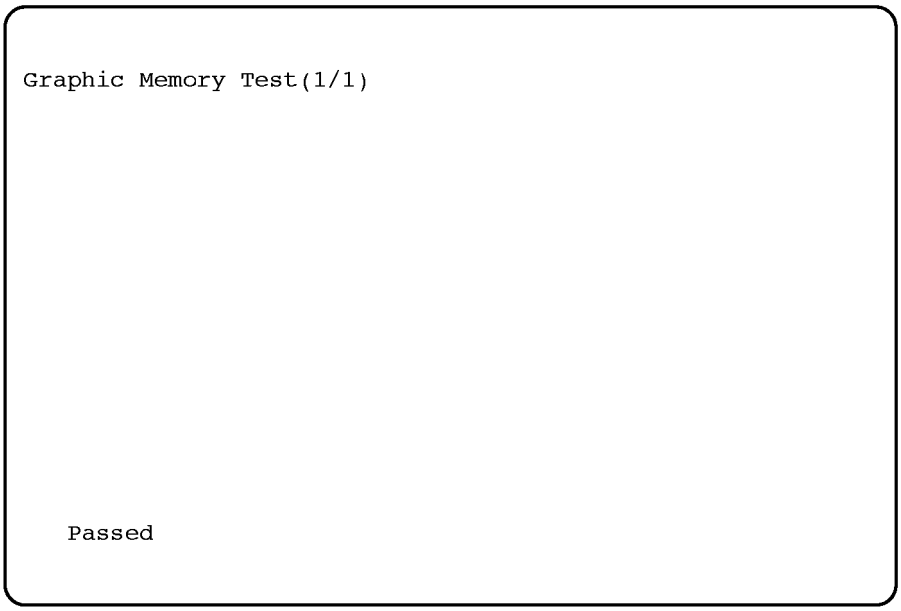
To test the Graphic memory of MASC board on MPU Assy. The CPU on MPU Assy sends data into the graphic memory of MASC board and reads the data of graphic memory.

CRITERIA

No Error : The test must successfully complete without error.

DISPLAY FORMAT OF RESULTS

Passed or Failed.



GRAPHIC MEMORY TEST MENU
ILLUSTRATION 2–44

Action if the test fails

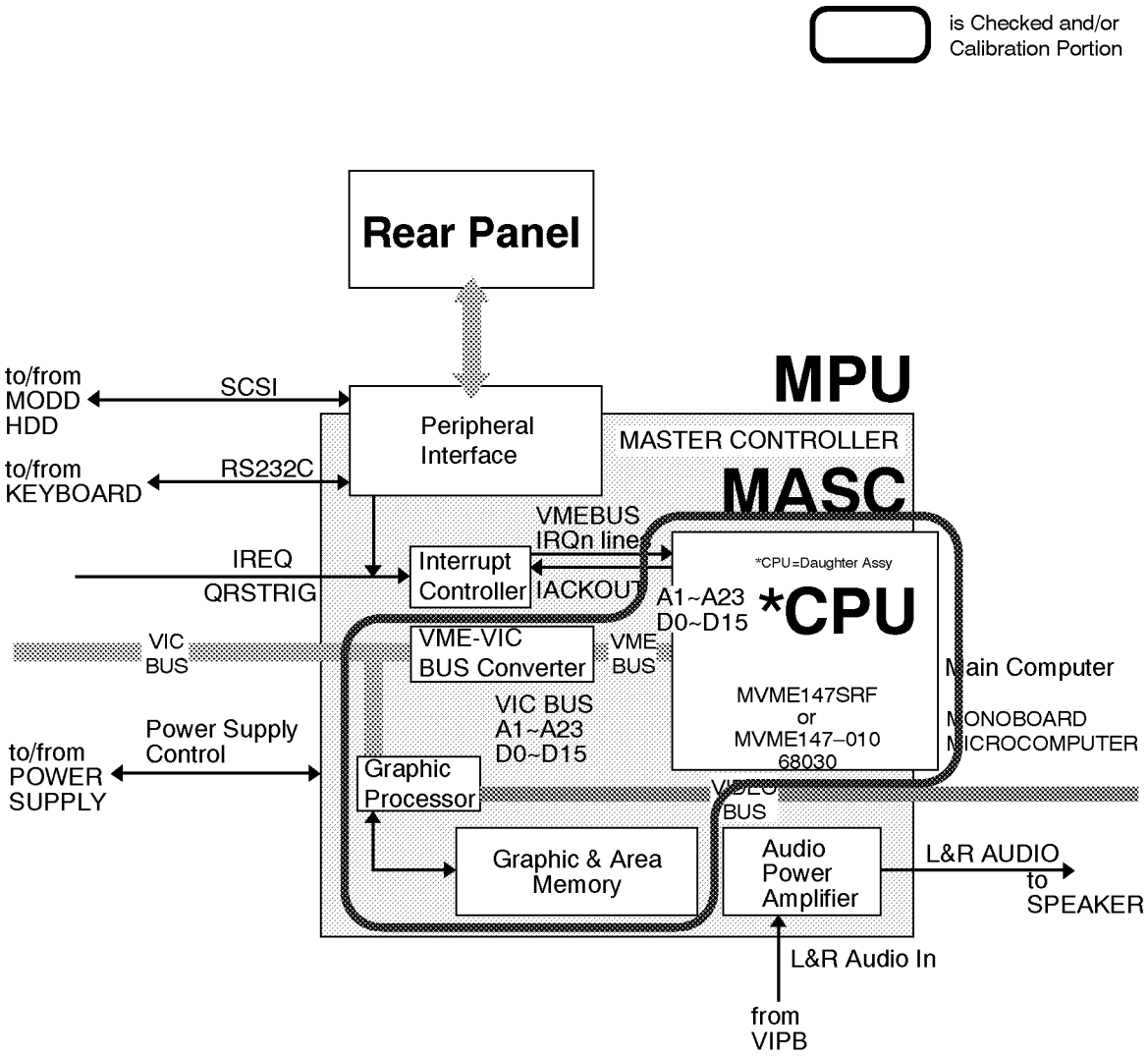
If other tests passed, change MPU Assy.

The following Assemblies are necessary for this test

CFM model: PS, MPU, BMRC, VIDO (or VIPB), KB, MON
B/W model: PS, MPU, BMRC, VIDM, KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 18 (Continued)



GRAPHIC MEMORY TEST
ILLUSTRATION 2–45

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 19

TEST NAME

BMRC MEMORY TEST

PURPOSE

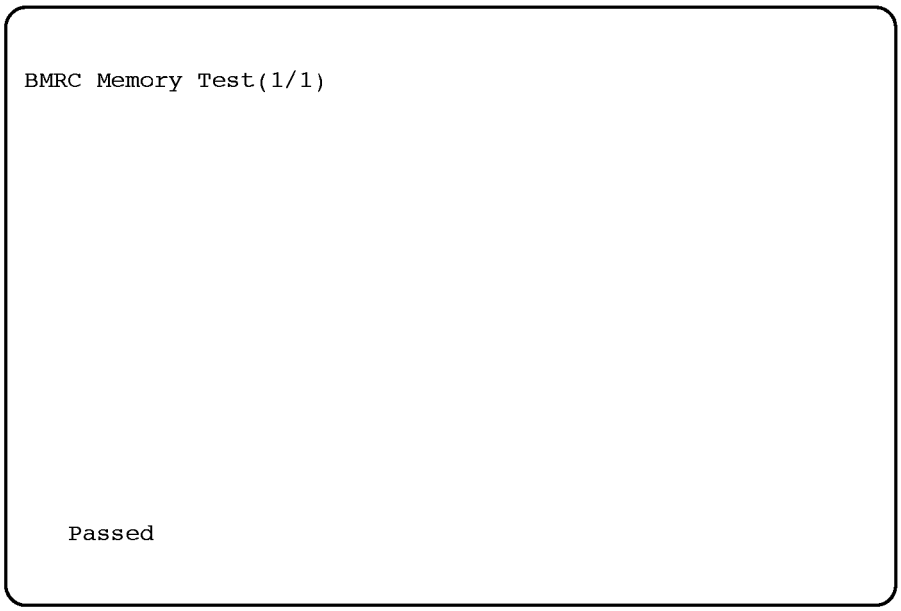
To test the BMRC Assy. The DSP on BMRC Assy writes data into the memory on BMRC Assy. The main computer reads data of the memory on BMRC Assy.

CRITERIA

No Error : The test must successfully complete without error.

DISPLAY FORMAT OF RESULTS

Passed or Failed.



BMRC MEMORY TEST MENU
ILLUSTRATION 2–46

Action if the test fails

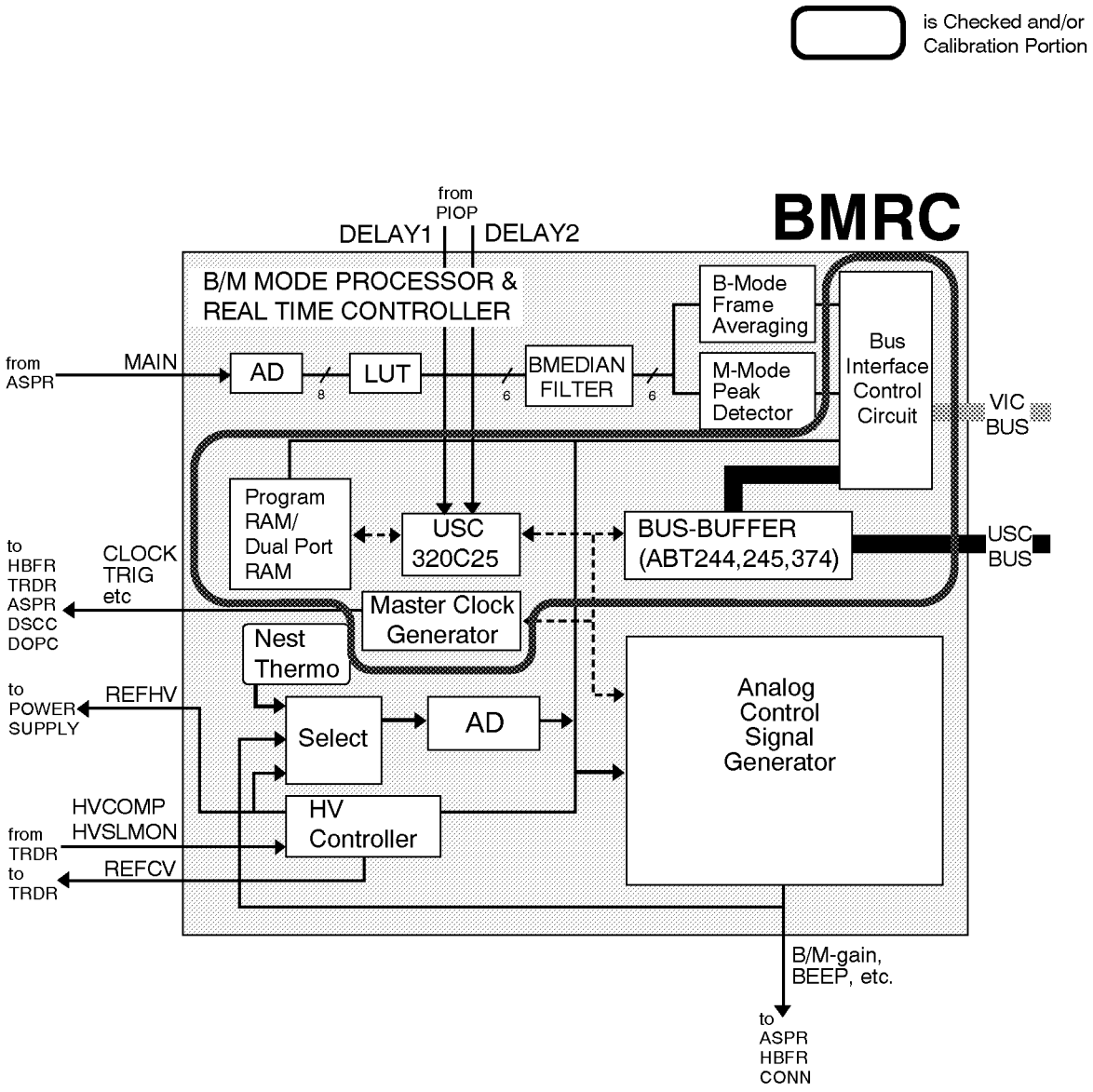
If other tests passed, change BMRC.

The following Assemblies are necessary for this test

CFM model: PS, MPU, BMRC, VIDO (or VIPB), KB, MON
B/W model: PS, MPU, BMRC, VIDM, KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 19 (Continued)



BMRC MEMORY TEST
ILLUSTRATION 2–47

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 20

TEST NAME

PIOP INTERFACE TEST

PURPOSE

To test the interface between PIOP Assy and TLMP block of TLMC Assy. The PIOP Assy receives the time code beep signal transmitted from VIDO (or VIPB) Assy and the ECG waveform is generated through TLMC Assy. The main computer measures the wave width.

Note

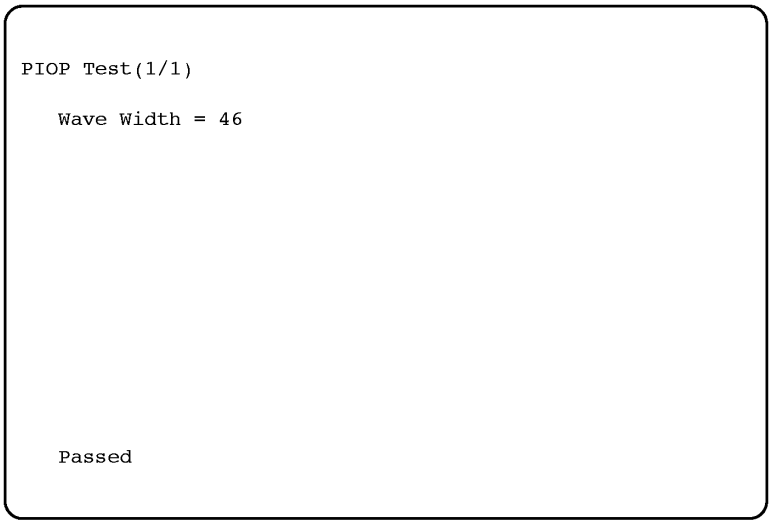
This test is invalid on the B/W monitor console.

CRITERIA

32 ≤ Wave Width ≤ 65

DISPLAY FORMAT OF RESULTS

Passed or Failed.



PIOP INTERFACE TEST MENU
ILLUSTRATION 2–48

Action if the test fails

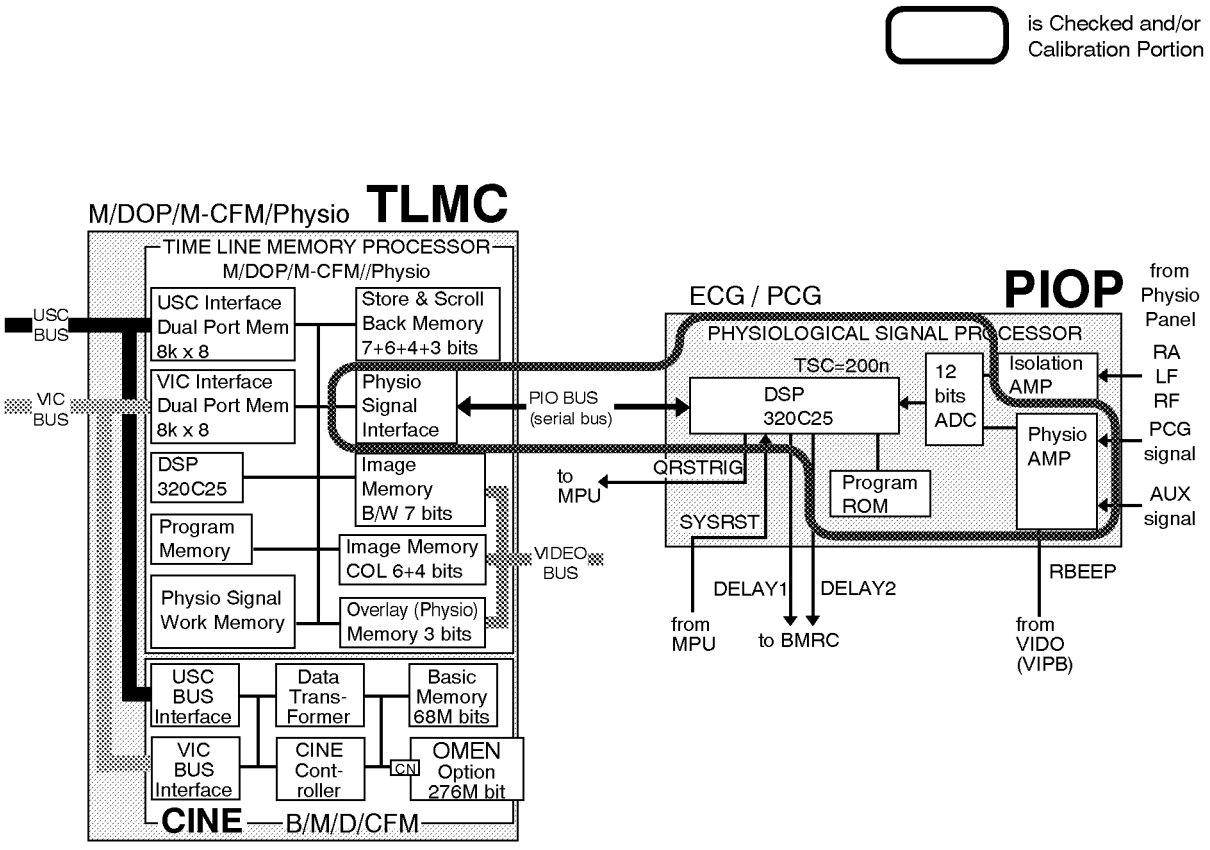
If there is no Beep sound, change VIDO (VIPB) Assy.
If there is a Beep sound, change PIOP Assy.

The following Assemblies are necessary for this test

PS, MPU, BMRC, ASPR, DOPC, DSCC, VIDO (or VIPB), KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 20 (Continued)



PIOP INTERFACE TEST
ILLUSTRATION 2–49

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 21

TEST NAME

KEYBOARD RAM TEST

PURPOSE

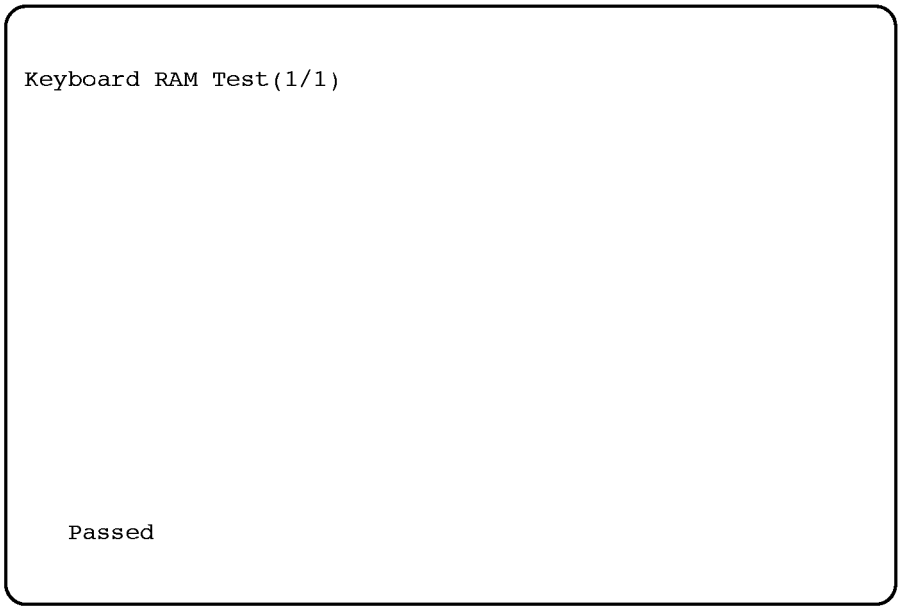
To test the memory of keyboard. The main computer writes data into the memory of keyboard and then reads data from the memory of keyboard.

CRITERIA

No Error : The test must successfully complete without error.

DISPLAY FORMAT OF RESULTS

Passed or Failed.



KEYBOARD RAM TEST MENU
ILLUSTRATION 2–50

Action if the test fails

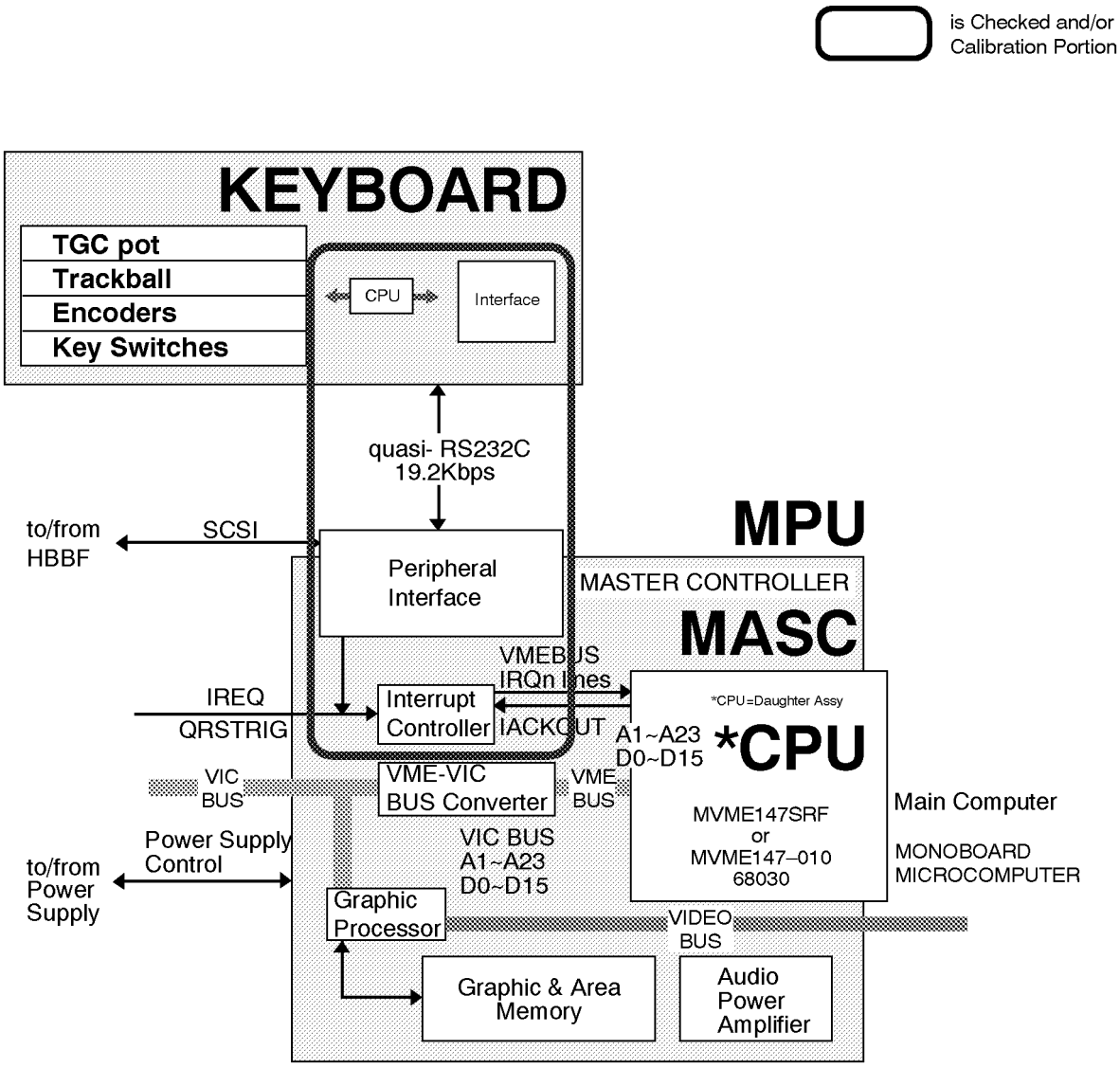
1. If other tests passed, change Keyboard Assy.
2. Perform this test again.
3. if failure still occurs, change MPU Assy.

The following Assemblies are necessary for this test

CFM model: PS, MPU, BMRC, ASPR, DOPC, DSCC, VIDO (or VIPB), KB, MON
B/W model: PS, MPU, BMRC, ASPR, VIDM, KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 21 (Continued)



KEYBOARD RAM TEST
ILLUSTRATION 2–51

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 22

TEST NAME

KEYBOARD LED TEST

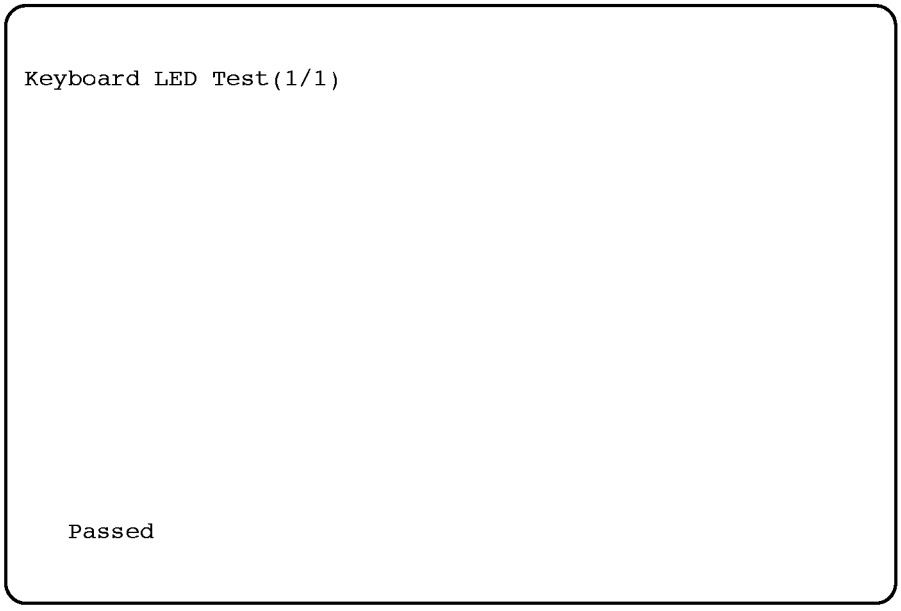
PURPOSE

To test the LEDs on keyboard. This test does not give the test result on the CRT monitor screen.

CRITERIA

All LEDs on the keyboard light ON.

DISPLAY FORMAT OF RESULTS



KEYBOARD LED TEST MENU
ILLUSTRATION 2–52

Action if the test fails

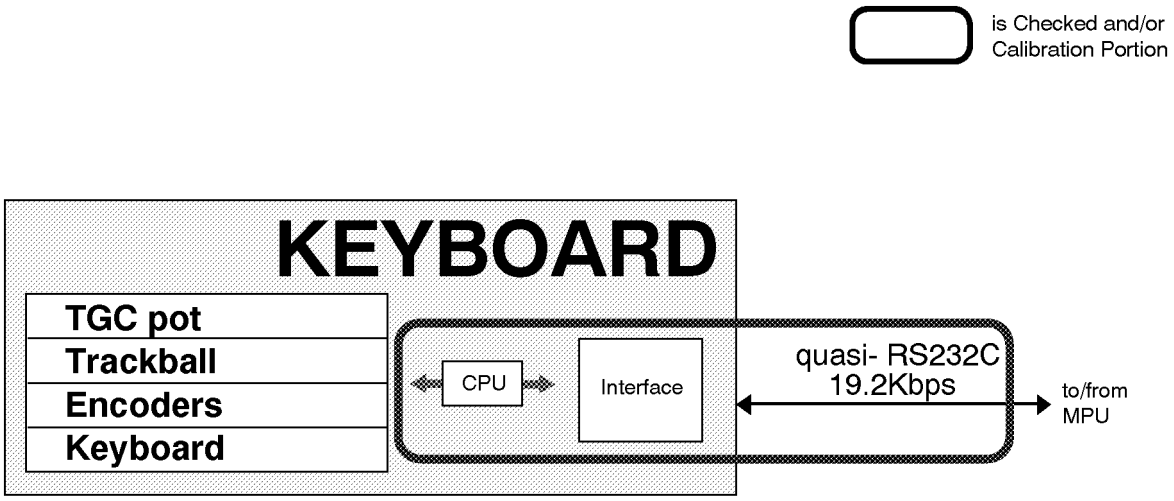
If other tests passed, change Keyboard Assy.

The following Assemblies are necessary for this test

CFM model: PS, MPU, BMRC, VIDO (or VIPB), KB, MON
B/W model: PS, MPU, BMRC, VIDM, KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 22 (Continued)



KEYBOARD LED TEST
ILLUSTRATION 2–53

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 23

TEST NAME

KEYBOARD MENU DISPLAY TEST

Note

This test is invalid on LOGIQ™ 400.

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2–4–1 Self Diagnosis (Continued)

TEST NUMBER 24

TEST NAME

KEYBOARD KEY SWITCH TEST

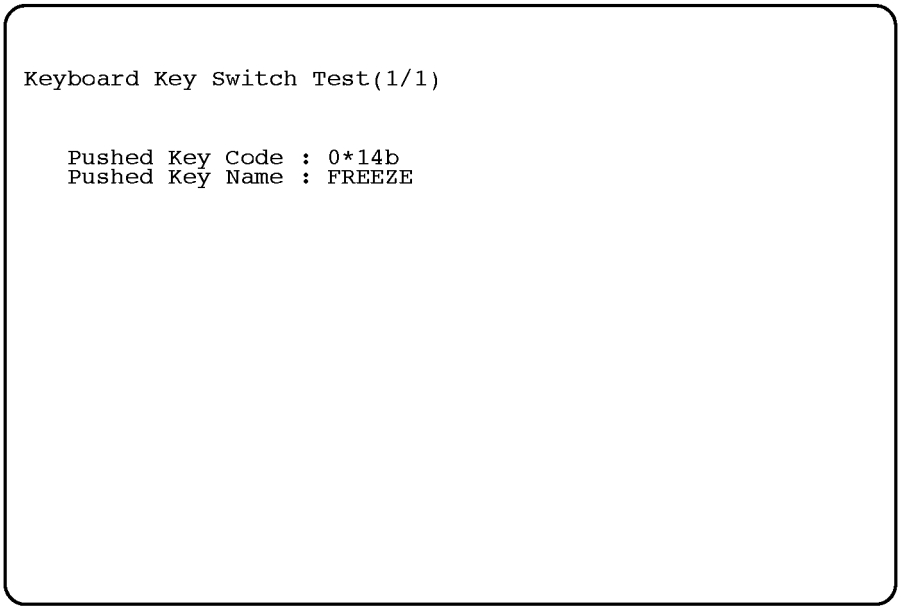
PURPOSE

To test the key switch on keyboard. The name and code of keys depressed by operator are displayed on the CRT monitor screen.

CRITERIA

Correct Key data displayed

DISPLAY FORMAT OF RESULTS



KEYBOARD KEY SWITCH TEST MENU
ILLUSTRATION 2–54

Action if the test fails

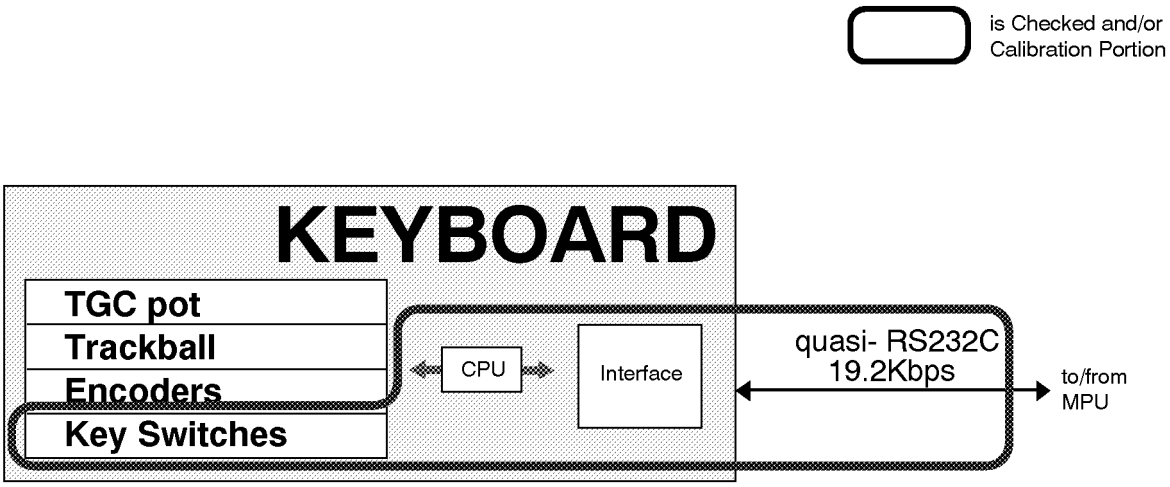
If other tests passed, change Keyboard.

The following Assemblies are necessary for this test

CFM model: PS, MPU, VIDO (or VIPB), KB, MON
B/W model: PS, MPU, VIDM, KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 24 (Continued)



KEYBOARD KEY SWITCH TEST
ILLUSTRATION 2–55

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 25

TEST NAME

TRACKBALL and ENCODER TEST

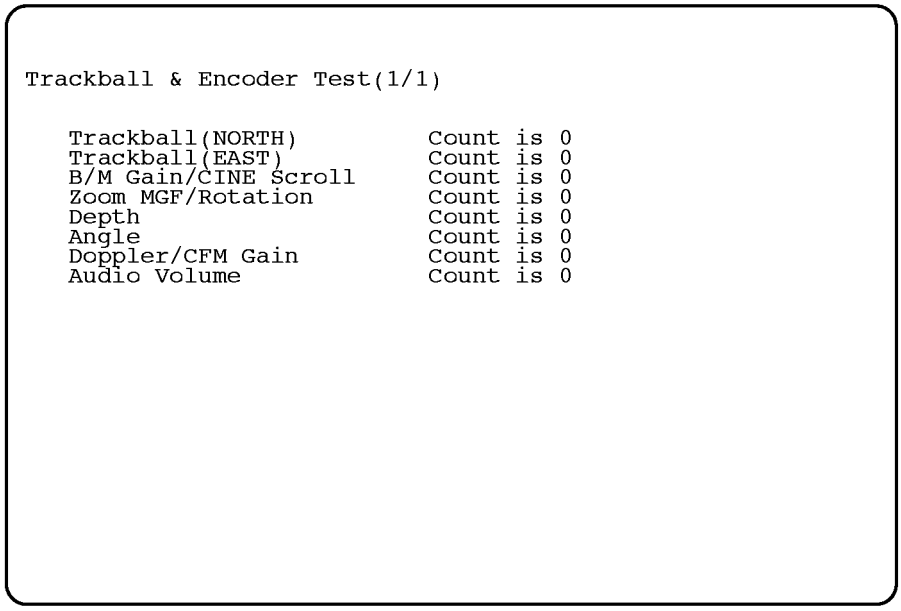
PURPOSE

To test the trackball and encoders on keyboard. The value of change which is detected by rotating encoders on the keyboard, is displayed on the CRT monitor screen.

CRITERIA

Correct detected value of encoder displayed

DISPLAY FORMAT OF RESULTS


Trackball & Encoder Test(1/1)
Trackball(NORTH) Count is 0
Trackball(EAST) Count is 0
B/M Gain/CINE Scroll Count is 0
Zoom MGF/Rotation Count is 0
Depth Count is 0
Angle Count is 0
Doppler/CFM Gain Count is 0
Audio Volume Count is 0

TRACKBALL AND ENCODER TEST MENU
ILLUSTRATION 2–56

Action if the test fails

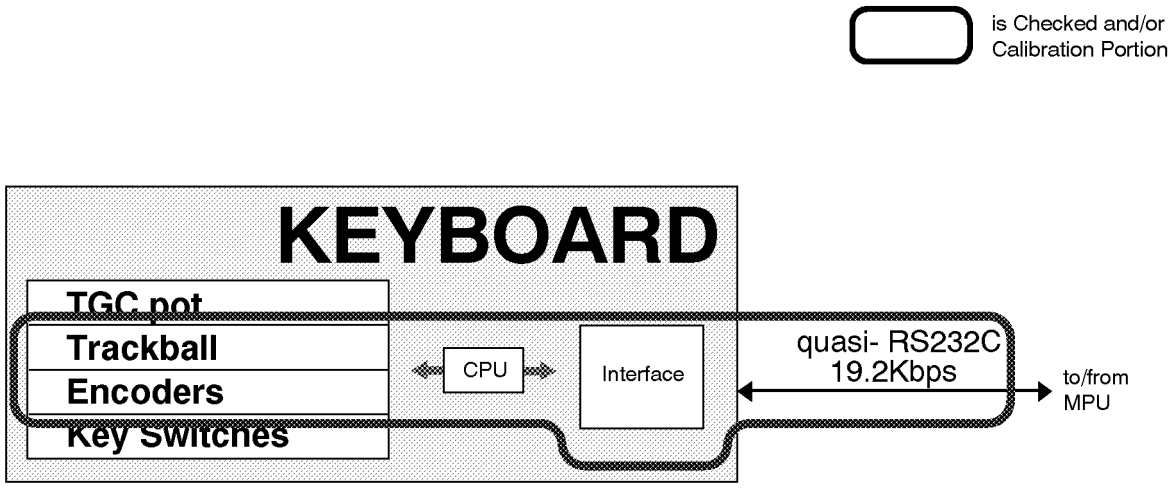
If other tests passed, change Keyboard or Trackball.

The following Assemblies are necessary for this test

CFM model: PS, MPU, VIDO (or VIPB), KB, MON
B/W model: PS, MPU, VIDM, KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 25 (Continued)



TRACKBALL AND ENCODER TEST
ILLUSTRATION 2–57

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 26

TEST NAME

ANALOG TGC TEST

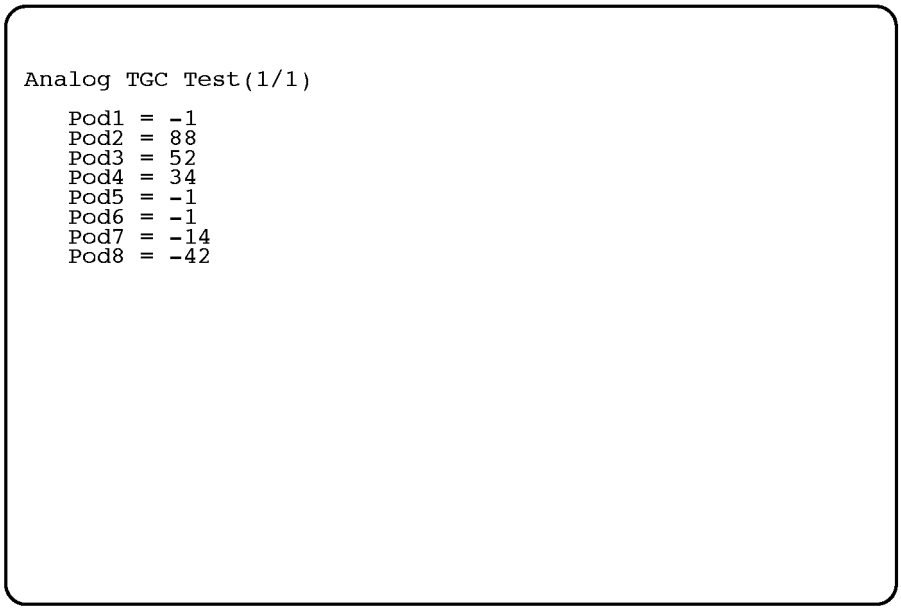
PURPOSE

To test the TGC on keyboard. The data for positions of eight TGC potentiometers are indicated on the CRT monitor screen.

CRITERIA

Correct control of analog TGC output.

DISPLAY FORMAT OF RESULTS



ANALOG TGC TEST MENU
ILLUSTRATION 2–58

Action if the test fails

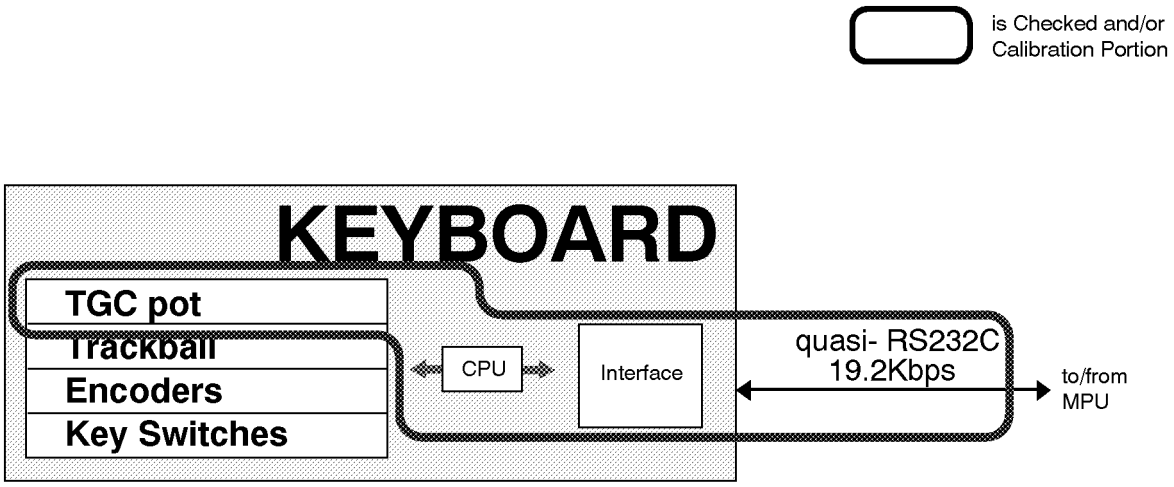
If other tests passed, change Keyboard Assy.

The following Assemblies are necessary for this test

CFM model: PS, MPU, BMRC, ASPR, DOPC, DSCC, VIDO (or VIPB), KB, MON
B/W model: PS, MPU, BMRC, ASPR, VIDM, KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 26 (Continued)



ANALOG TGC TEST
ILLUSTRATION 2–59

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 27

TEST NAME

POWER SUPPLY & THERMAL TEST

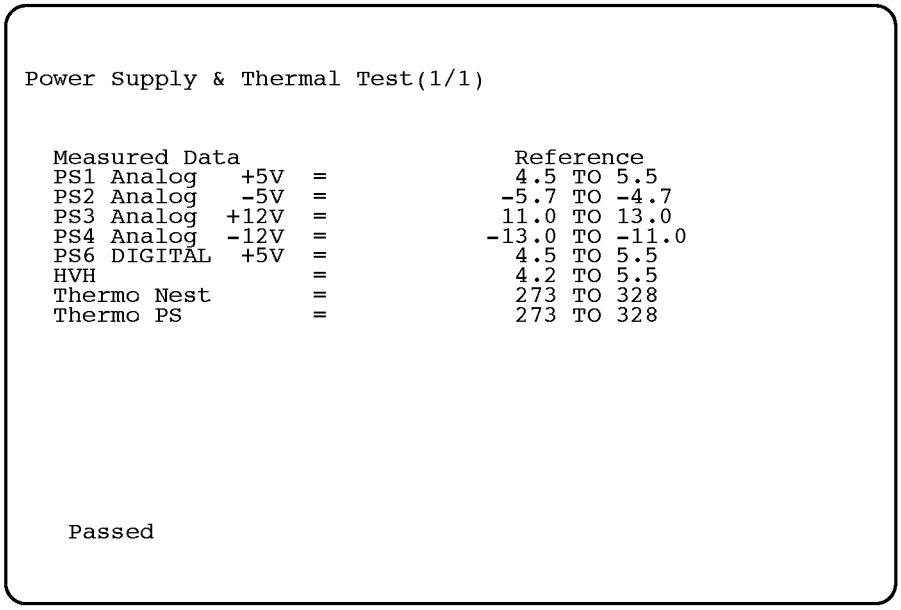
PURPOSE

To check the output voltage of power supply and the temperature of NEST and power supply unit.

CRITERIA

Refer to the Reference displayed on the CRT monitor screen.

DISPLAY FORMAT OF RESULTS


Power Supply & Thermal Test(1/1)
Measured Data
Reference
PS1 Analog +5V = 4.5 TO 5.5
PS2 Analog -5V = -5.7 TO -4.7
PS3 Analog +12V = 11.0 TO 13.0
PS4 Analog -12V = -13.0 TO -11.0
PS6 DIGITAL +5V = 4.5 TO 5.5
HVH = 4.2 TO 5.5
Thermo Nest = 273 TO 328
Thermo PS = 273 TO 328
Passed

POWER SUPPLY & THERMAL TEST MENU
ILLUSTRATION 2–60

Action if the test fails

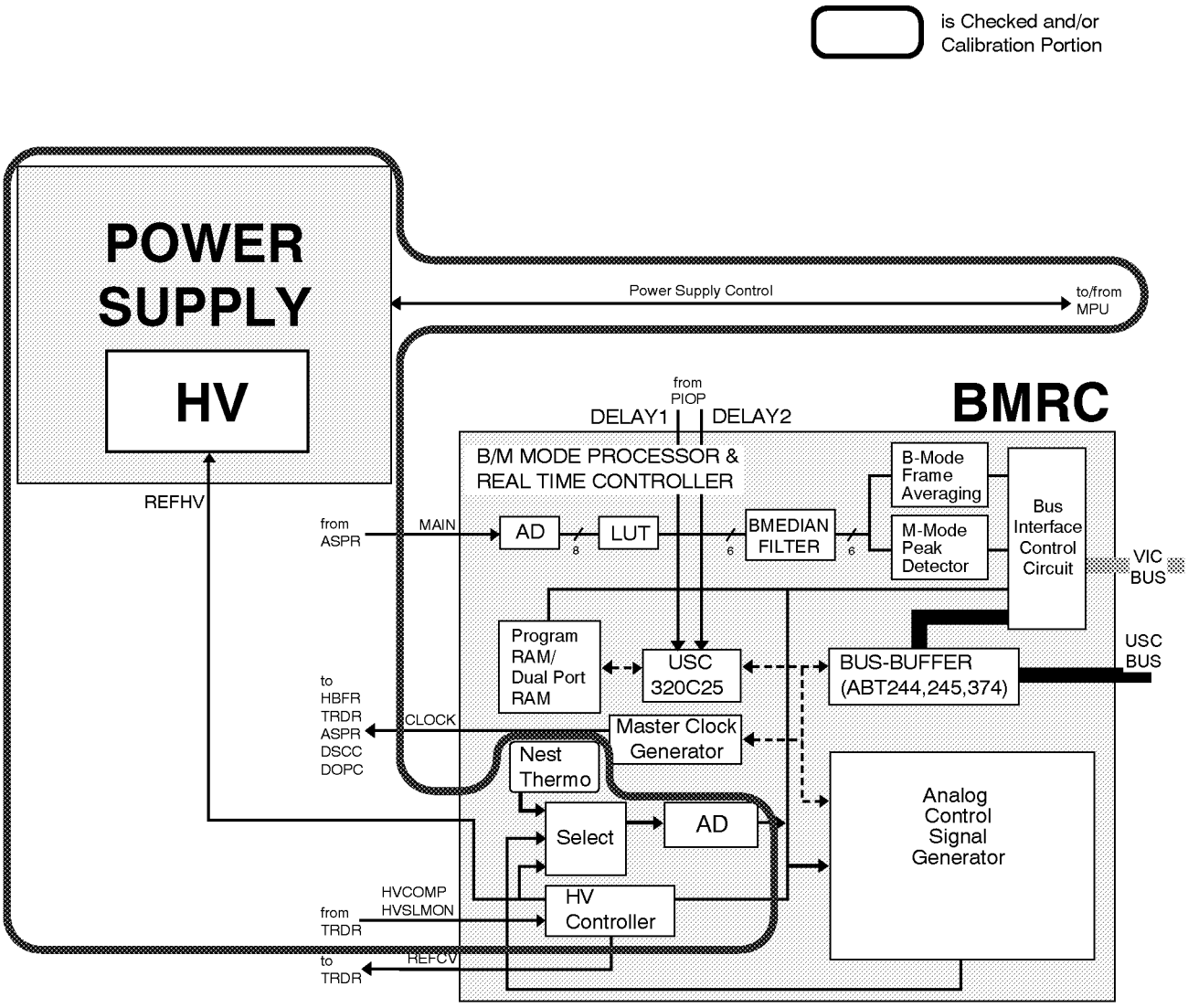
1. Check the incorrect voltage with a digital voltmeter.
2. If actual voltage is incorrect, change the Low Voltage Unit involved in Power Supply.
3. If actual voltage is correct, change BMRC Assy.

The following Assemblies are necessary for this test

CFM model: PS, MPU, PROBE, BMRC, ASPR, DOPC, DSCC, VIDO (or VIPB), KB, MON
B/W model: PS, MPU, PROBE, BMRC, ASPR, VIDM, KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 27 (Continued)



POWER SUPPLY & THERMAL TEST
ILLUSTRATION 2–61

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 28

TEST NAME

OPERATING TIME TEST

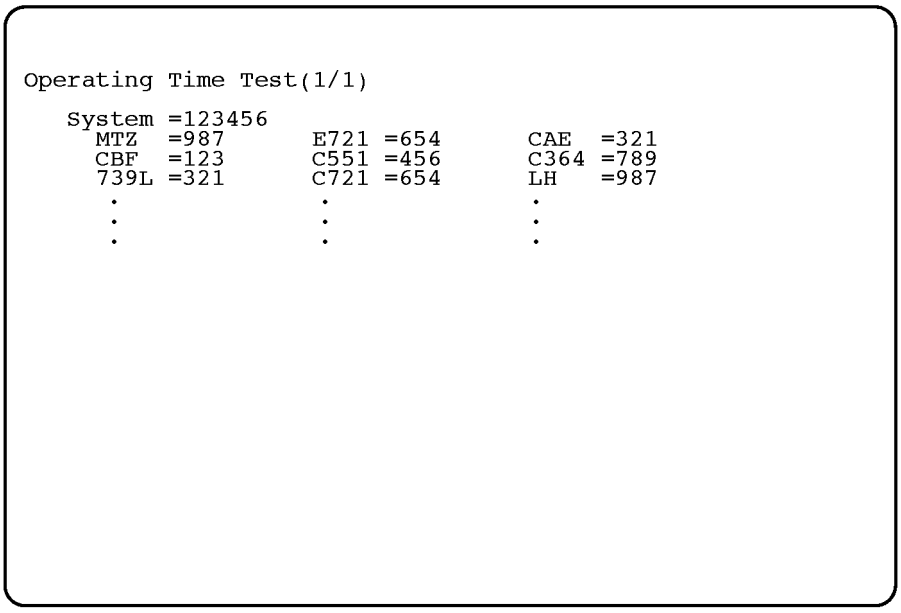
PURPOSE

To check the operating time of system and all probes.

CRITERIA

No Error : This test must successful complete without error.

DISPLAY FORMAT OF RESULTS



OPERATING TIME TEST MENU
ILLUSTRATION 2–62

Action if the test fails

Note

If some files in the hard disk are damaged, this test may not be performed properly. In that case, replace the hard disk of console.

The following Assemblies are necessary for this test

CFM model: PS, MPU, HBFR, BMRC, ASPR, DOPC, DSCC, VIDO (or VIPB), KB, MON
B/W model: PS, MPU, HBFR, BMRC, ASPR, VIDM, KB, MON

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2–4–1 Self Diagnosis (Continued)

TEST NUMBER 29

TEST NAME

B MODE NOISE FLOOR TEST

PURPOSE

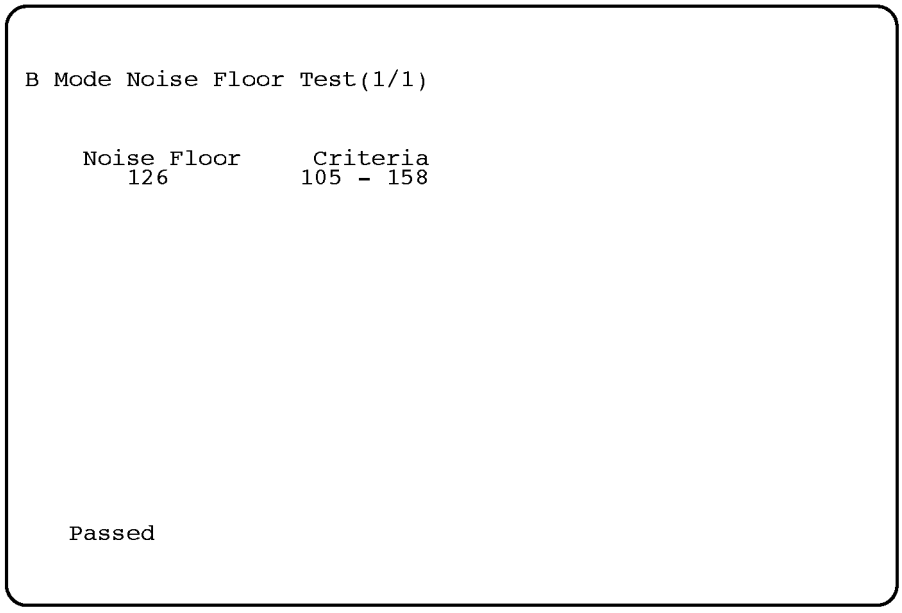
To check the noise floor level of B Mode image.

CRITERIA

No Error : The test must successfully complete without error.

DISPLAY FORMAT OF RESULTS

B–Mode Noise floor test passed or failed.



B MODE NOISE FLOOR TEST MENU
ILLUSTRATION 2–63

Action if the test fails

If other tests passed, you should doubt outside factors. Contact your service support center.

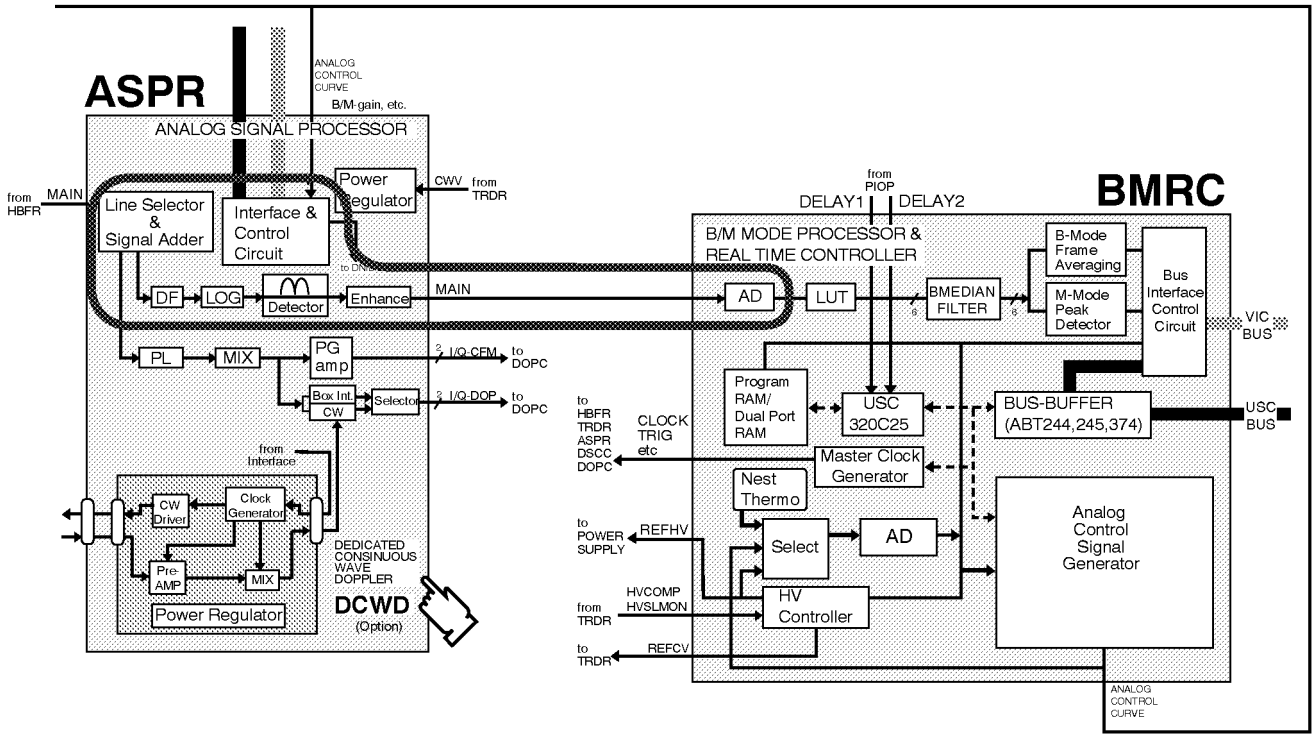
The following Assemblies are necessary for this test

CFM model: PS, MPU, BMRC, ASPR, DOPC, VIDO (or VIPB), KB, MON
B/W model: PS, MPU, BMRC, ASPR, VIDM, KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 29 (Continued)

is Checked and/or Calibration Portion



B MODE NOISE FLOOR TEST
ILLUSTRATION 2–64

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 30

TEST NAME

D MODE NOISE FLOOR TEST

PURPOSE

To check the noise floor level of D Mode image.

Note

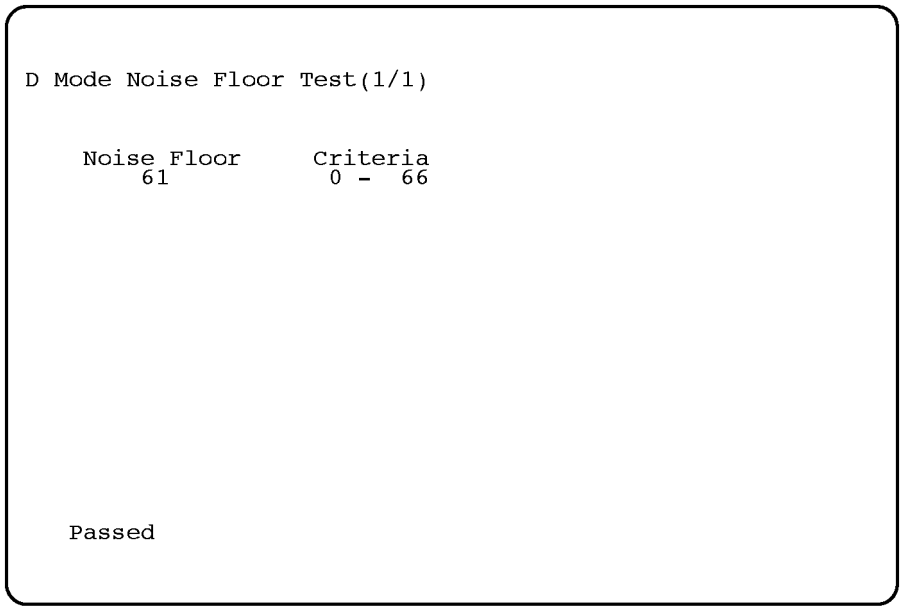
This test is invalid on the B/W monitor console.

CRITERIA

No Error : The test must successfully complete without error.

DISPLAY FORMAT OF RESULTS

D Mode Noise floor test passed or failed.



D MODE NOISE FLOOR TEST MENU
ILLUSTRATION 2–65

Action if the test fails

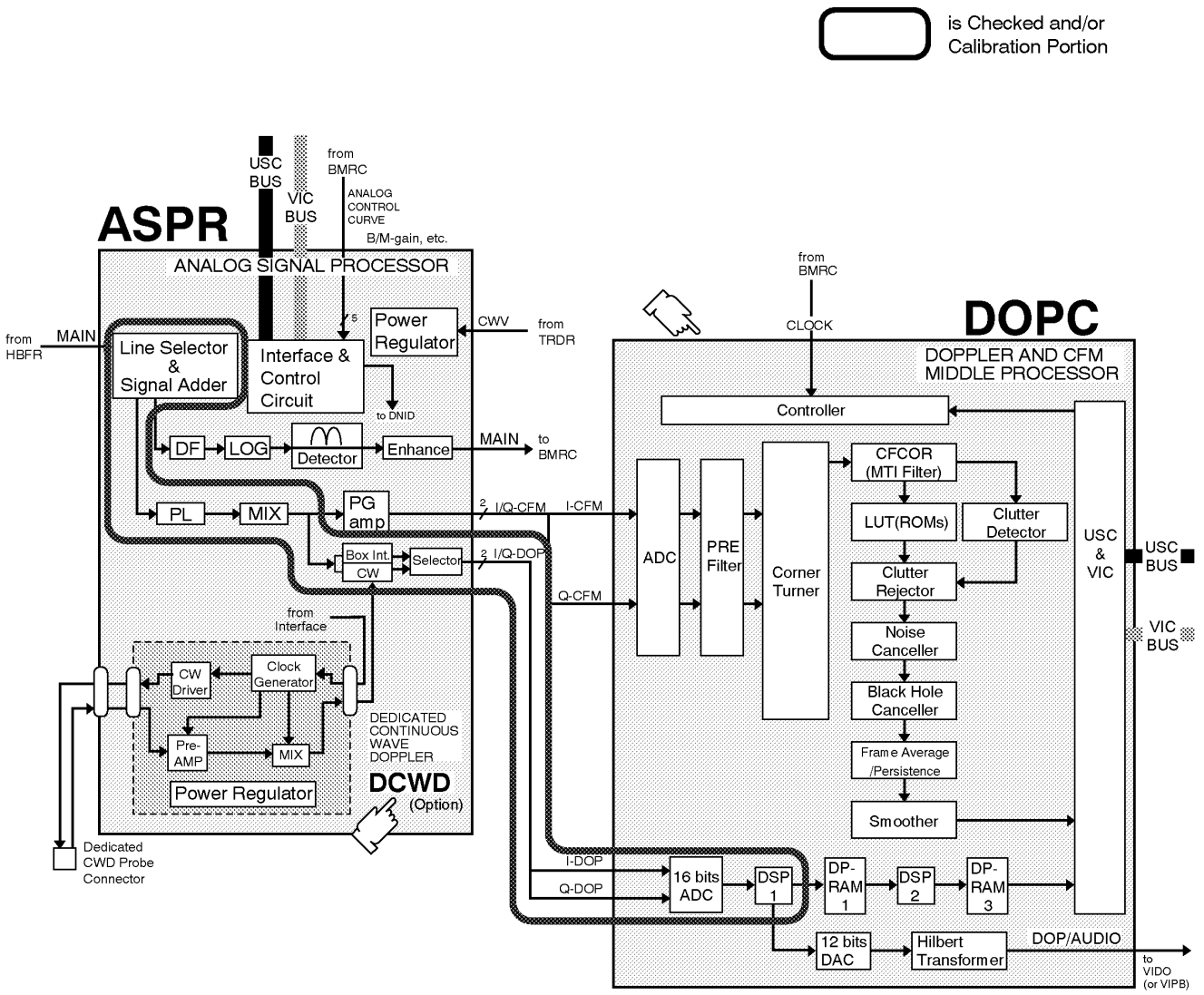
If other tests passed, you should doubt outside factors. Contact your service support center.

The following Assemblies are necessary for this test

PS, MPU, BMRC, ASPR, DOPC, VIDO (or VIPB), KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 30 (Continued)



D MODE NOISE FLOOR TEST
ILLUSTRATION 2–66

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 31

TEST NAME

CFM MODE NOISE FLOOR TEST

PURPOSE

To check the noise floor level of CFM Mode image.

Note

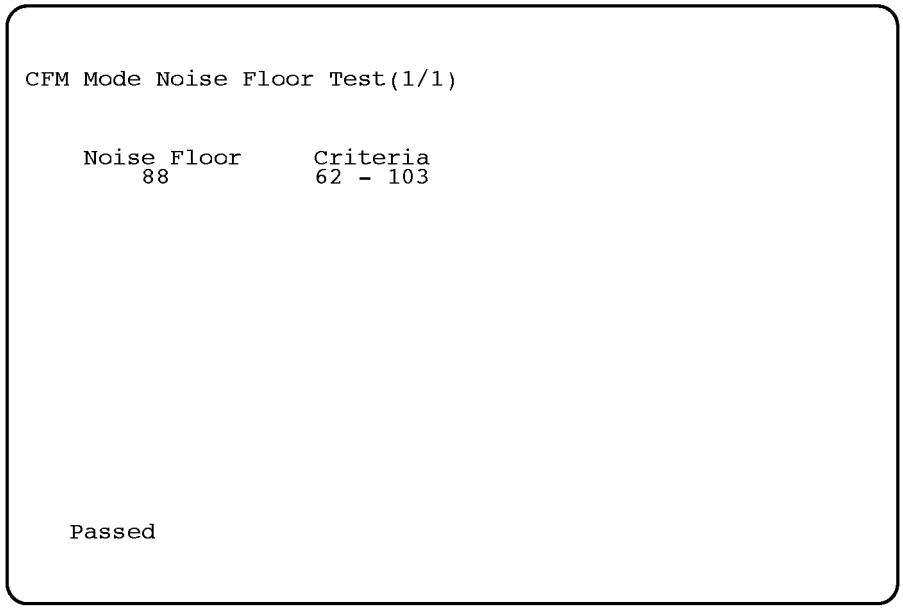
This test is invalid on the B/W monitor console.

CRITERIA

No Error : The test must successfully complete without error.

DISPLAY FORMAT OF RESULTS

CFM Mode Noise floor test passed or failed.



CFM MODE NOISE FLOOR TEST MENU
ILLUSTRATION 2–67

Action if the test fails

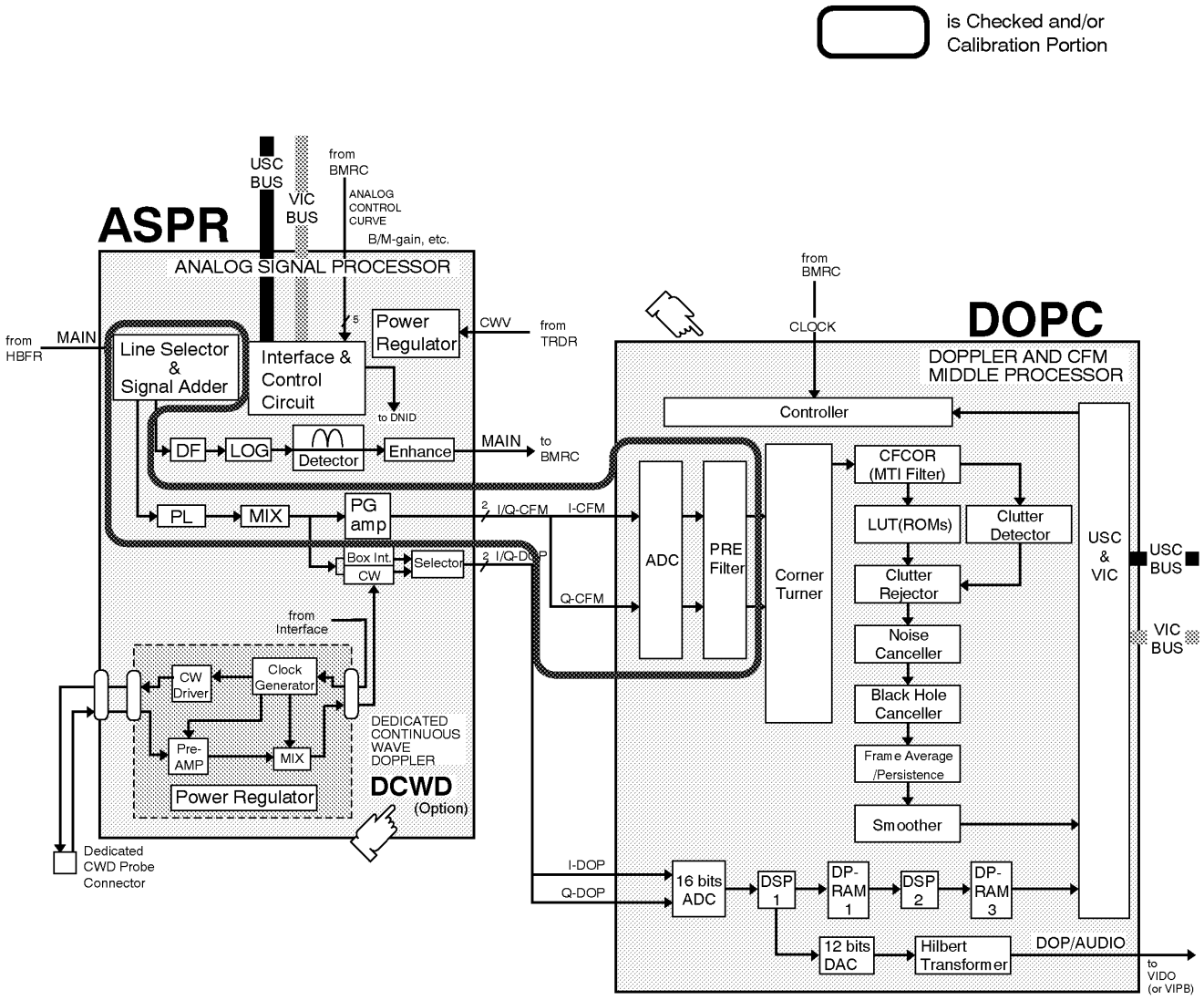
If other tests passed, you should doubt outside factors. Contact your service support center.

The following Assemblies are necessary for this test

PS, MPU, BMRC, ASPR, DOPC, DSCC, VIDO (or VIPB), KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 31 (Continued)



CFM MODE NOISE FLOOR TEST
ILLUSTRATION 2–68

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 32

TEST NAME

DOPPLER CALIBRATION TEST

PURPOSE

To adjust the I–Q valance by performing the doppler calibration automatically. This suppresses the mirror image in Doppler Mode.

Note

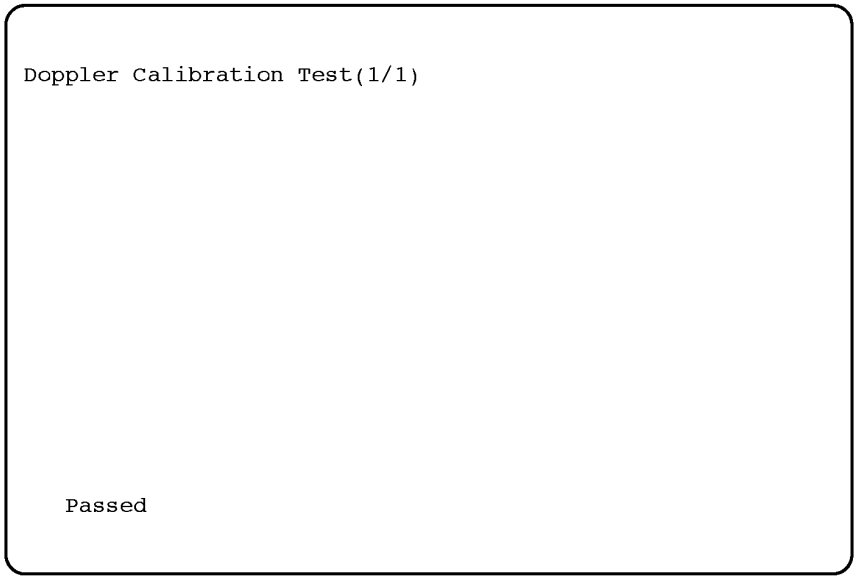
This test is invalid on the B/W monitor console.

CRITERIA

No Error : The test must successfully complete without error.

DISPLAY FORMAT OF RESULTS

Doppler calibration test passed or failed.



DOPPLER CALIBRATION TEST MENU
ILLUSTRATION 2–69

Action if the test fails

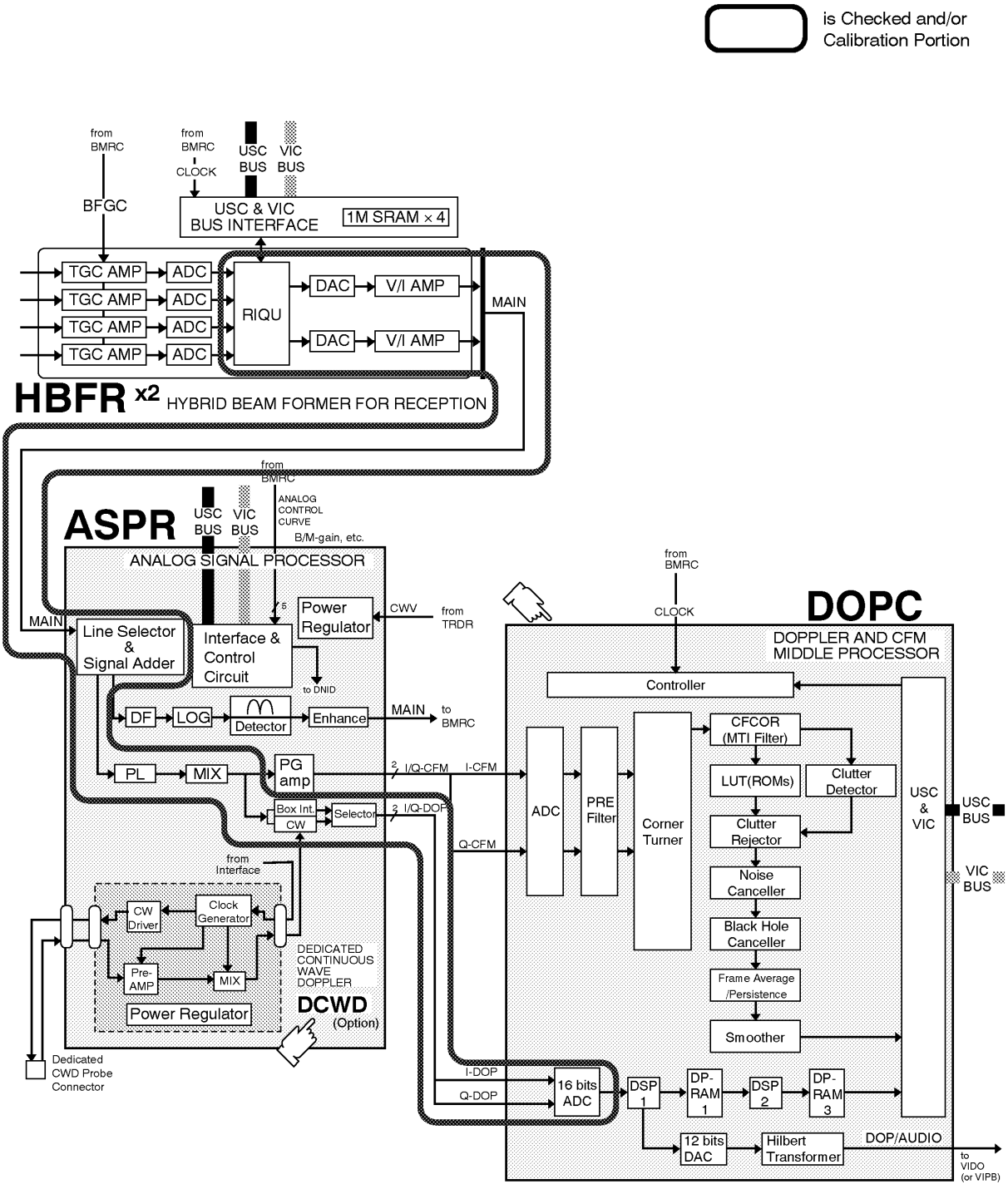
1. Change HBFR Assy.
2. Perform Doppler Calibration Test 1 again. If failure still occurs change ASPR Assy.
3. Perform Doppler Calibration Test 1 again. If failure still occurs, change DOPC Assy.

The following Assemblies are necessary for this test

PS, MPU, TRDR, HBFR, BMRC, ASPR, DOPC, TLMC, KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 32 (Continued)



DOPPLER CALIBRATION TEST
ILLUSTRATION 2–70

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 33

TEST NAME

DCWD MODE NOISE FLOOR TEST

Note

This test is not available on the console with software version 3.10 or former.

PURPOSE

To check the noise floor level of DCWD Mode image.

Note

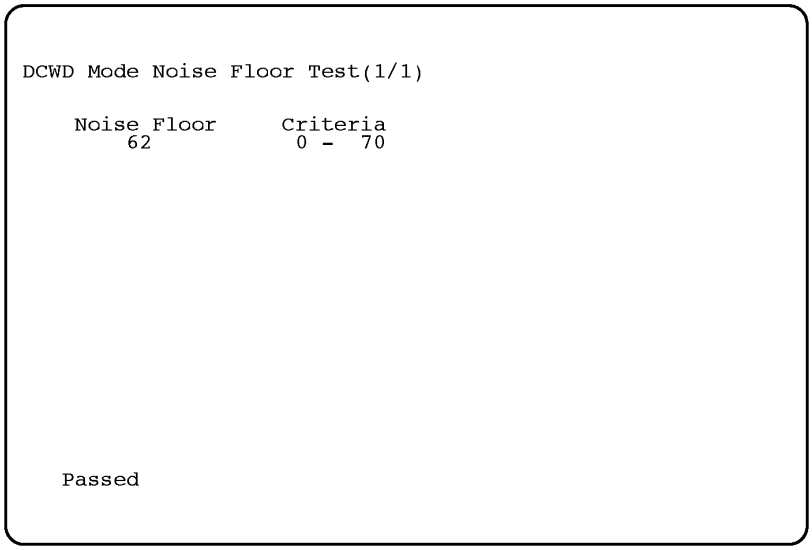
The Single CWD option is available only for the CFM model. Therefore, this test is invalid on the B/W monitor console.

CRITERIA

No Error : The test must successfully complete without error.

DISPLAY FORMAT OF RESULTS

DCWD Mode noise floor test passed or failed.



DCWD MODE NOISE FLOOR TEST MENU
ILLUSTRATION 2–71

Action if the test fails

If other test passed, you should doubt outside factor. Contact your service support center.

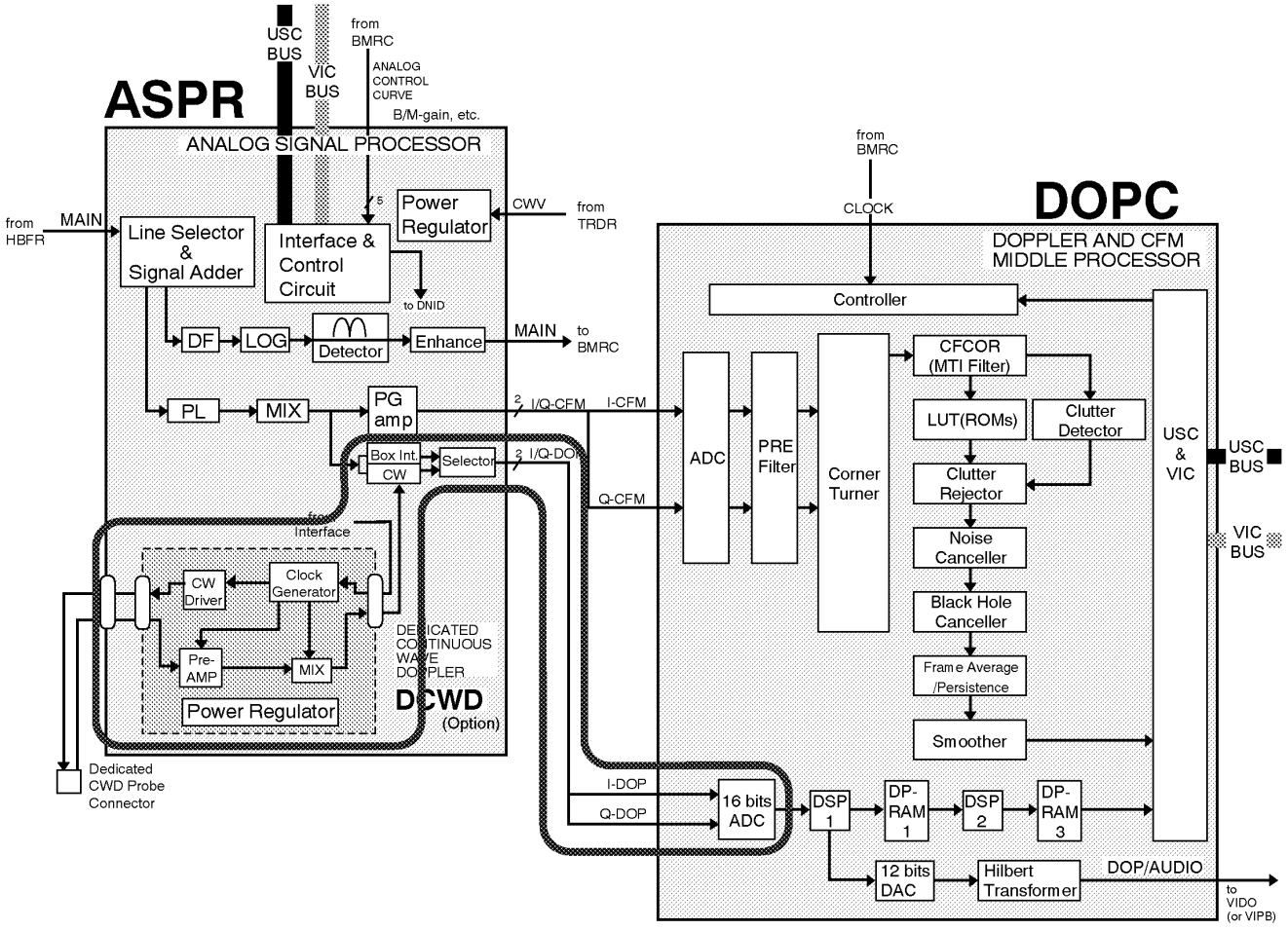
The following Assemblies are necessary for this test

PS, MPU, BMRC, ASPR, DCWD, DOPC, DSCC, VIDO (or VIPB), KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 33 (Continued)

is Checked and/or Calibration Portion



DCWD MODE NOISE FLOOR TEST
ILLUSTRATION 2–72

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 34

TEST NAME

TRANSDUCER TEST 2

Note

This test is not available on the console with software version 3.00 or former.

PURPOSE

To test the probe connected with console. This can check the detective elements of probes by measuring echo level.

CRITERIA

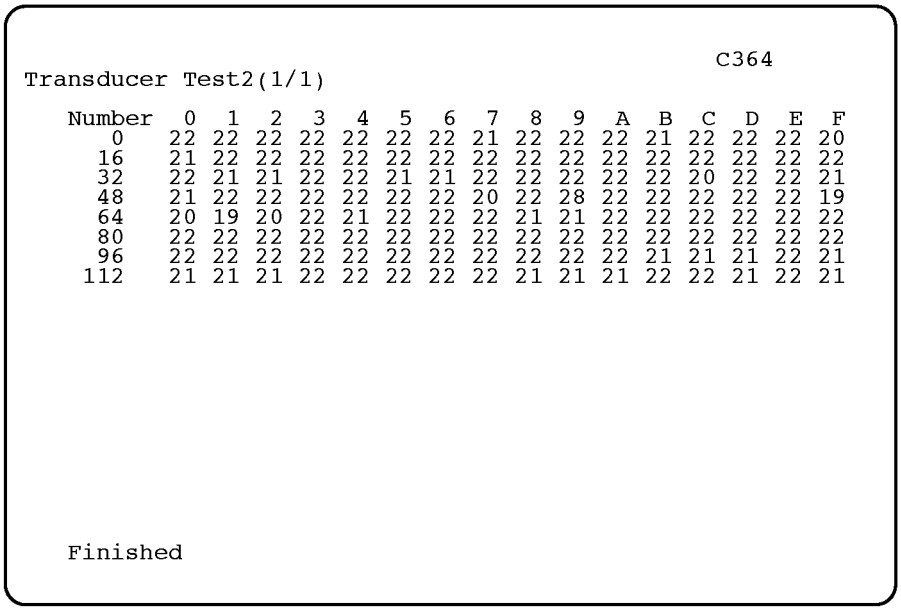
Echo level of every elements is almost uniform.

Note

There is no absolute criteria for this test–it simply shows the specific echo level data for each element. Run test 7; Transducer Test for Pass/Fail result.

DISPLAY FORMAT OF RESULTS

Depending on the probe connected, the number (indicating channels) can be different.



TRANSDUCER TEST MENU
ILLUSTRATION 2–73

Action if the test fails

1. Make sure that the probe is connected properly.
2. Perform this test again.
3. If the projecting value still appear, replace the probe.

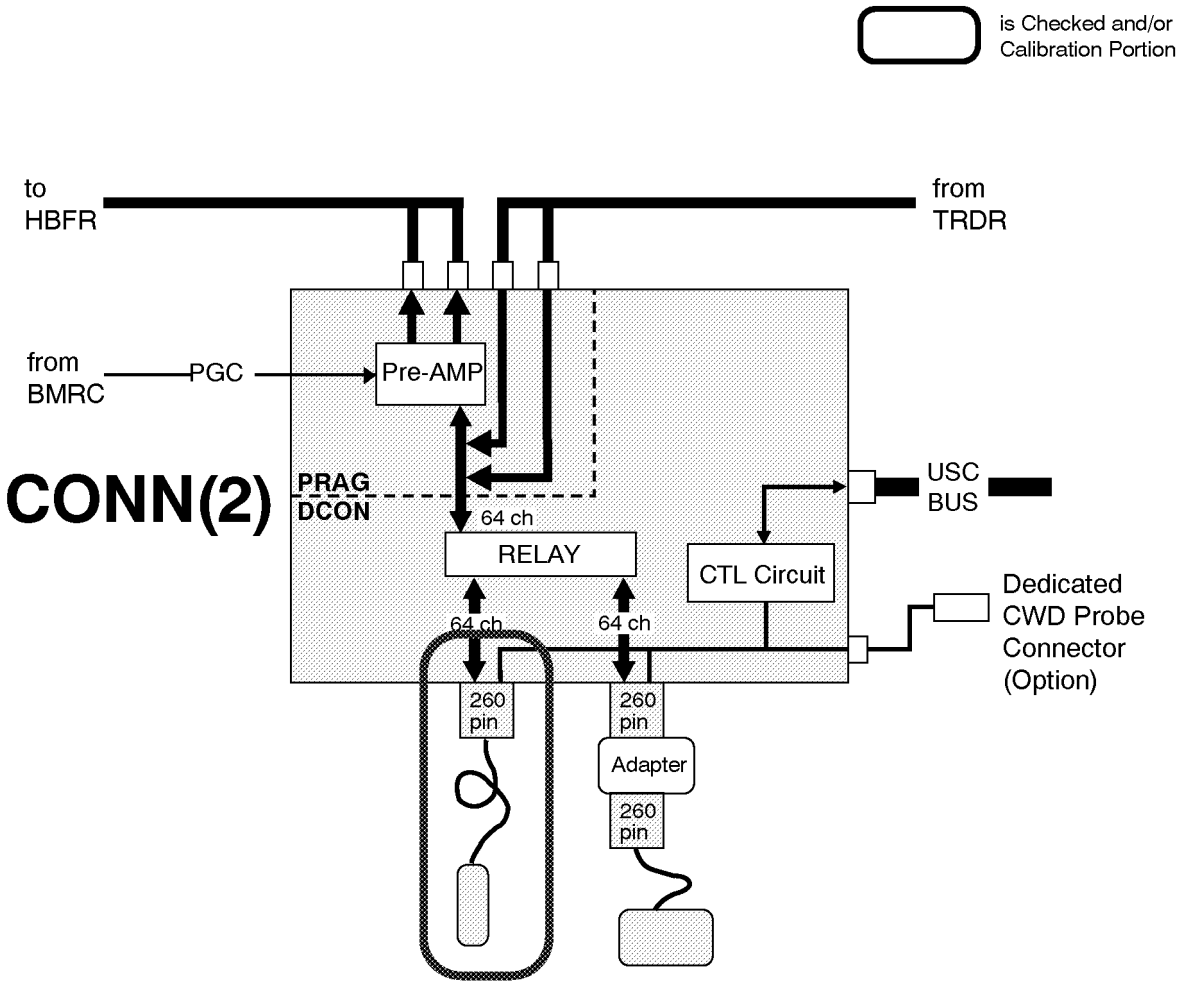
The following Assemblies are necessary for this test

CFM model: PS, MPU, PROBE, CONN, TRDR, HBFR, BMRC, ASPR, DOPC, DSCC, VIDO (or VIPB), KB, MON

B/W model: PS, MPU, PROBE, CONN, TRDR, HBFR, BMRC, ASPR, VIDM, KB, MON

2–4–1 Self Diagnosis (Continued)

TEST NUMBER 34 (Continued)



TRANSDUCER TEST 2
ILLUSTRATION 2–74

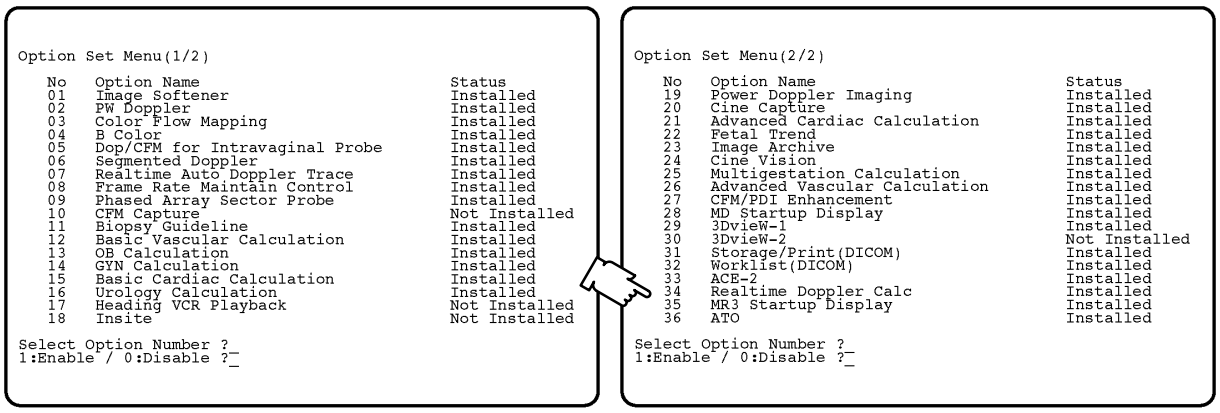
2–4–2 Option Set

Procedure

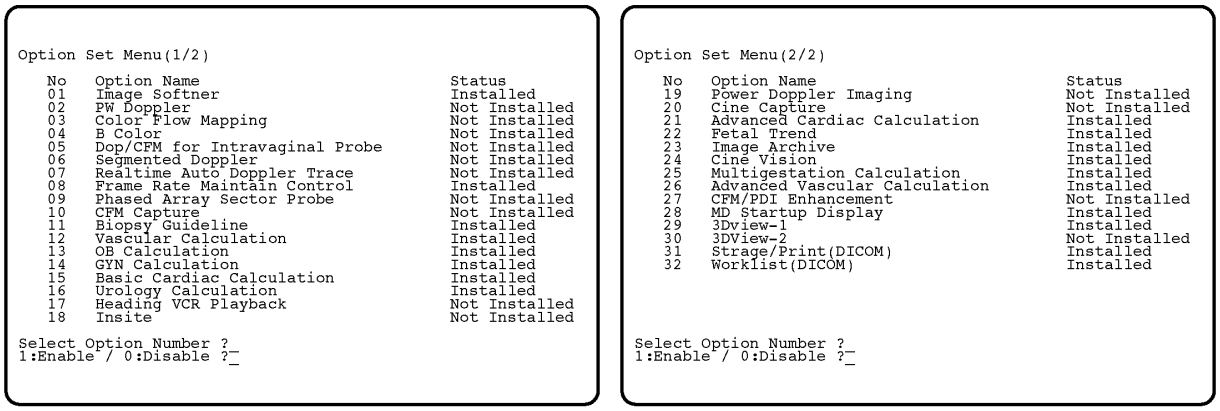
Follow these steps to set the option.

1. Input <2> at the Service Test Menu. Refer to ILLUSTRATION 2–6.

   The Option Set Menu will appear on the CRT monitor as shown in the ILLUSTRATION 2–75.


Option Set Menu(1/2)
No Option Name Status
01 Image Softener Installed
02 PW Doppler Installed
03 Color Flow Mapping Installed
04 B Color Installed
05 Dop/CFM for Intravaginal Probe Installed
06 Segmented Doppler Installed
07 Realtime Auto Doppler Trace Installed
08 Frame Rate Maintain Control Installed
09 Phased Array Sector Probe Installed
10 CFM Capture Not Installed
11 Biopsy Guideline Installed
12 Basic Vascular Calculation Installed
13 OB Calculation Installed
14 GYN Calculation Installed
15 Basic Cardiac Calculation Installed
16 Urology Calculation Installed
17 Heading VCR Playback Not Installed
18 Insite Not Installed
Select Option Number ?
1:Enable / 0:Disable ?
Option Set Menu(2/2)
No Option Name Status
19 Power Doppler Imaging Installed
20 Cine Capture Installed
21 Advanced Cardiac Calculation Installed
22 Fetal Trend Installed
23 Image Archive Installed
24 Cine Vision Installed
25 Multigestation Calculation Installed
26 Advanced Vascular Calculation Installed
27 CFM/PDI Enhancement Installed
28 MD Startup Display Installed
29 3DvieW-1 Installed
30 3DvieW-2 Not Installed
31 Storage/Print(DICOM) Installed
32 Worklist(DICOM) Installed
33 ACE-2 Installed
34 Realtime Doppler Calc Installed
35 MR3 Startup Display Installed
36 ATO Installed
Select Option Number ?
1:Enable / 0:Disable ?

Sample Display for CFM Console


Option Set Menu(1/2)
No Option Name Status
01 Image Softner Installed
02 PW Doppler Not Installed
03 Color Flow Mapping Not Installed
04 B Color Not Installed
05 Dop/CFM for Intravaginal Probe Not Installed
06 Segmented Doppler Not Installed
07 Realtime Auto Doppler Trace Not Installed
08 Frame Rate Maintain Control Installed
09 Phased Array Sector Probe Not Installed
10 CFM Capture Not Installed
11 Biopsy Guideline Installed
12 Vascular Calculation Installed
13 OB Calculation Installed
14 GYN Calculation Installed
15 Basic Cardiac Calculation Installed
16 Urology Calculation Installed
17 Heading VCR Playback Not Installed
18 Insite Not Installed
Select Option Number ?
1:Enable / 0:Disable ?
Option Set Menu(2/2)
No Option Name Status
19 Power Doppler Imaging Not Installed
20 Cine Capture Not Installed
21 Advanced Cardiac Calculation Installed
22 Fetal Trend Installed
23 Image Archive Installed
24 Cine Vision Installed
25 Multigestation Calculation Installed
26 Advanced Vascular Calculation Installed
27 CFM/PDI Enhancement Not Installed
28 MD Startup Display Installed
29 3Dview-1 Installed
30 3DView-2 Not Installed
31 Strage/Print(DICOM) Installed
32 Worklist(DICOM) Installed
Select Option Number ?
1:Enable / 0:Disable ?

Sample Display for B/W Console

OPTION SET MENU
ILLUSTRATION 2–75

Note

Items 25 to 27, Multigestation Calculation, Advanced Vascular Calculation, and PDI/CFM Enhancement, are added from the console with system software version 3.00 or later.

2–4–2 Option Set (continued)

Note

The following option items are not available on the LOGIQ™ 400CL console:

OPTION NO.	OPTION NAME
09	Phased Array Sector Probe
17	Heading VCR Playback
21	Advanced Cardiac Calculation
29	3DvieW–1

Note

Items 29 and 31, 3DvieW–1 and DICOM, are available on the MD console with system software version 3.40 or later. These options are not available on the B&W system.

Note

Items 30, 3DvieW–2 is NOT available on all of the LOGIQ™ 400 console.

Note

The following three (3) options are available on the LOGIQ™ 400 console with the software version 4.01y or later:

OPTION NO.	OPTION NAME
33	ACE–2
34	Realtime Doppler Calculation
35	MR3 Startup Display

Note

Item 36, ATO option is not available on the console with the software versions 4.01y and 4.02y.

The status of each option will be indicated.

2. Input the Option Number which will should be enabled or disabled and then Input the <1> (Enable) or <0> (Disable).

2–4–3 Database Initialize

Procedure

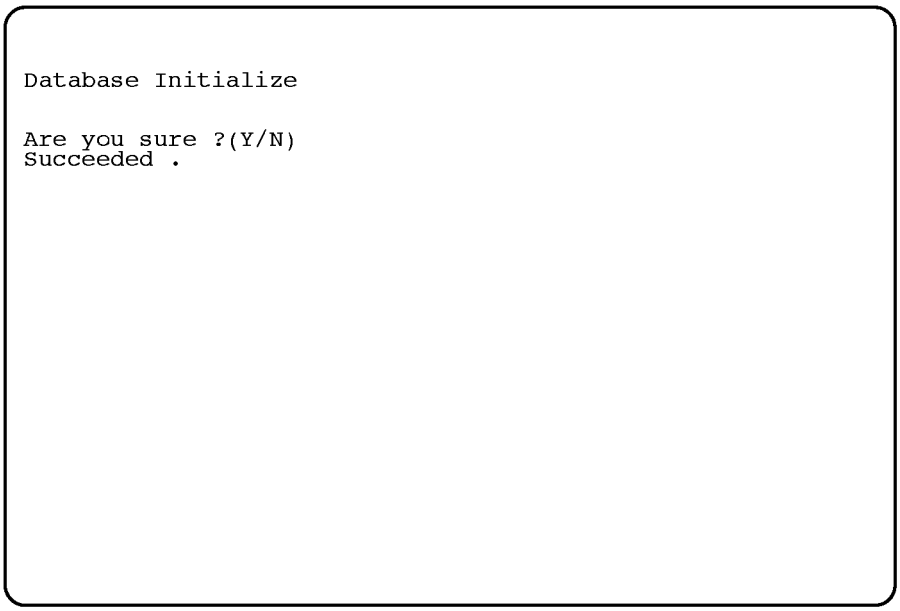
Follow these steps to initialize the database which is saved in the LOGIQ™ 400.

Note

If this function is performed, the database which is saved in the LOGIQ™ 400 will be initialized. Some preset datum remain unchanged. To initialize the preset data to the factory default completely, use the Country/Zone Initialize of the System Preset Parameter Setup. Refer to section 2–4–5.

1. Input <3> at the Service Test Menu. Refer to ILLUSTRATION 2–6.

   The Database Initialize Menu will appear on the CRT monitor as shown in the ILLUSTRATION 2–76.



DATABASE INITIALIZE MENU
ILLUSTRATION 2–76

2. Input <Y> and then press the <Return> Key.

2–4–4 Software Version Up

Procedure

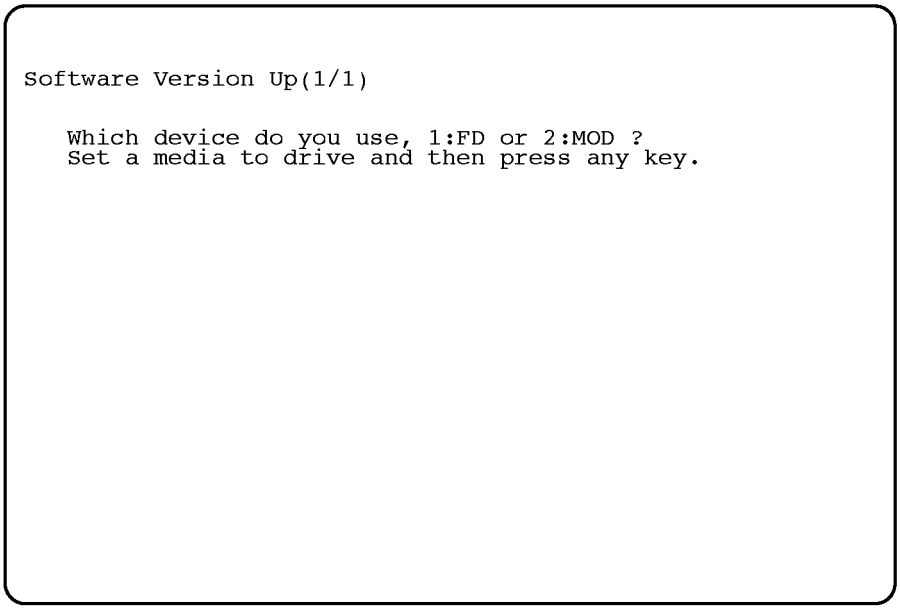
Follow these steps to update the software version.

Note

The user data stored in the console is not deleted if the appropriate media to update the software version is used.

1. Input <4> at the Service Test Menu. Refer to ILLUSTRATION 2–6.

   The Software Version Up Menu will appear on the CRT monitor as shown in the ILLUSTRATION 2–77.



SOFTWARE VERSION UP MENU
ILLUSTRATION 2–77

2. Press 2 to select a MO (Magneto Optical) disk.
3. Set the MO disk to MOD drive on the LOGIQ™ 400 and then press the <Return> Key.

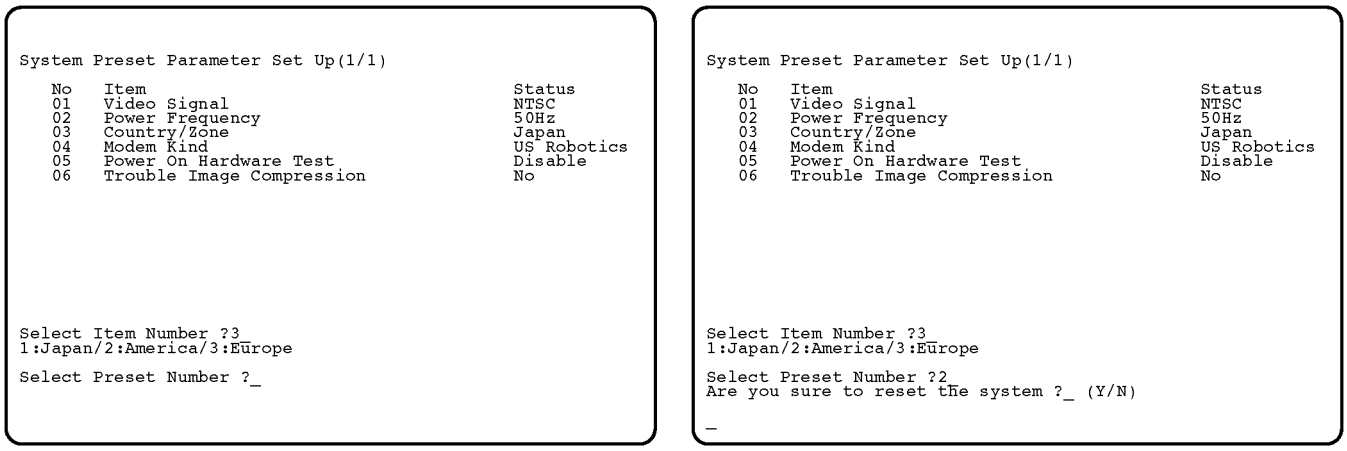
2–4–5 System Preset Parameter Set Up

Procedure

Follow these steps to set the system preset parameter.

1. Input <5> at the Service Test Menu. Refer to ILLUSTRATION 2–6.

   The System Preset Parameter Menu will appear on the CRT monitor as shown in the ILLUSTRATION 2–78.


System Preset Parameter Set Up(1/1)
No Item Status
01 Video Signal NTSC
02 Power Frequency 50Hz
03 Country/Zone Japan
04 Modem Kind US Robotics
05 Power On Hardware Test Disable
06 Trouble Image Compression No
Select Item Number ?3
1:Japan/2:America/3:Europe
Select Preset Number ?_
System Preset Parameter Set Up(1/1)
No Item Status
01 Video Signal NTSC
02 Power Frequency 50Hz
03 Country/Zone Japan
04 Modem Kind US Robotics
05 Power On Hardware Test Disable
06 Trouble Image Compression No
Select Item Number ?3
1:Japan/2:America/3:Europe
Select Preset Number ?2
Are you sure to reset the system ?_ (Y/N)
_

SYSTEM PRESET PARAMETER MENU
ILLUSTRATION 2–78

Item Number	Item Name	Preset Parameter			
01	Video Signal	1. NTSC	2.PAL		
02	Power Frequency	1. 60Hz	2. 50Hz		
03	Country/Zone	1. Japan	2. America	3.Europe	4.Asia
04	Modem Kind	1. US Robotics	2. Motorola 3265		
05	Power On Hardware Test	0: Disable	1: Enable		
06	Trouble Image Compression	0: No	1: LZW		

Note

It is necessary to reset the system after setting the item 03, Country/Zone. The message ”Are you sure to reset the system? (Y/N)” will be displayed after setting the Country/Zone. It takes approximately 30 minutes to complete this system reset process.

Note

In case of B/W monitor console, setting the different video signal causes the monitor to display improper screen. Be sure to set the correct video signal.

2. Input the Item number which will should be preset along with the preset number and the press the <Return> key.

2–4–5 System Preset Parameter Set Up (Continued)

Note

In the case of the B/W monitor console, it is necessary to change the settings of Option Set and System Parameters after setting the Country/Zone. If the required changes are not done properly, the system will not be functioning properly and the system error messages are displayed on the CRT monitor screen frequently because the system is initialized as a CFM console. The required changes are:

(1) The following items in the Option Set Menu shall be set to the “Not Installed”.

02	PW Doppler
03	Color Flow Mapping
04	B Color
05	Dop/CFM for Intravaginal Probe
06	Segmented Doppler
07	Real Time Auto Doppler Trace
17	Heading VCR Playback

(2) The following parameters in the System Parameter shall be set to the “White”.

Col Sys Inf
Col ImagCrs
Col Scale
Col Comment
Col Mes Crs
Col Applcat
Col Moving
Col Aux
Col DopTrace

For more details regarding the setting procedures, refer to section 2–4–2, Option Set and LOGIQ™ 400 User Manual.

2–4–6 Key Operation History

Procedure

Follow these steps to display the record of the Key Operation History.

1. Input <6> at the Service Test Menu. Refer to ILLUSTRATION 2–6.

   The Key Operation History Menu will be displayed on the CRT monitor as shown in the ILLUSTRATION 2–79.

```
Key Operation History(1/3)

 No    Name                  Data
 000   RETURN                Cd =0x0d
 001   6                     Cd =0x36
 002   CONTROL-R             Cd =0x92
 003   CONTROL               Cd =0x01
 004   TGC                   P1=  -1 P2=   0 P3=  -1 P4=  -1
                             P5=  -1 P6=   0 P7=  21 P8=  12
 005   AUDIO VOLUME          Cnt=   3
 006   TOP MENU SELECT       Cd =0x55
 007   TOP MENU SELECT       Cd =0x55
 008   SUB MENU KEY DOWN     Cd =0x52
 009   SUB MENU KEY RIGHT    Cd =0x51
 010   SUB MENU KEY RIGHT    Cd =0x51
 011   TOP MENU SELECT       Cd =0x55
 012   CLEAR                 Cd =0x44
 013   COMMENT               Cd =0x02
 014   B/M GAIN/CINE SCROLL  Cnt= -11
 015   TRACKBALL             X  =  48  Y  =   4
 016   DOPPLER/CFM GAIN      Cnt=   5
 017   PROBE SELECT          Cd =0x54
 018   PROBE SELECT          Cd =0x54
```

KEY OPERATION HISTORY MENU
ILLUSTRATION 2–79

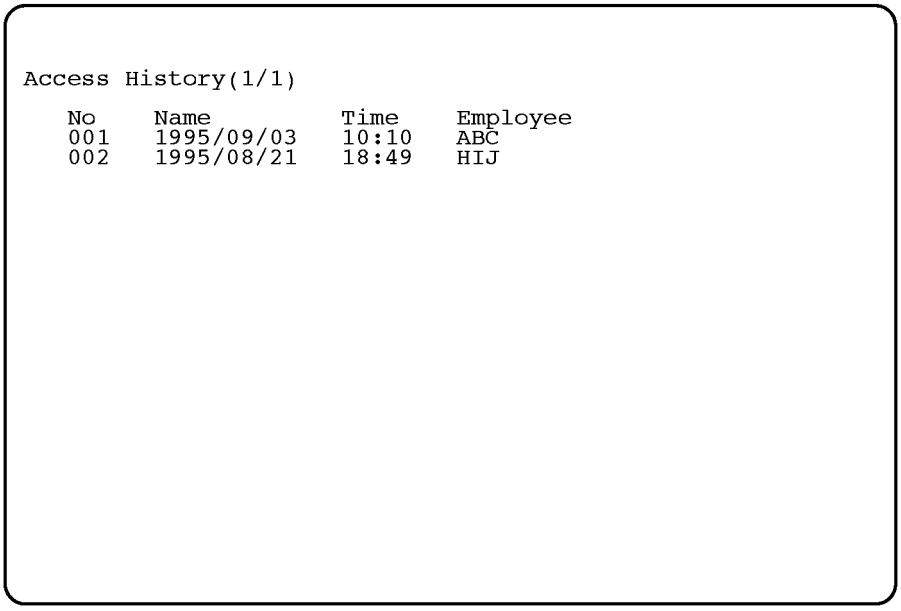
2–4–7 Access History

Procedure

Follow these steps to display the record of the Employee access history.

1. Input <7> at the Service Test Menu. Refer to ILLUSTRATION 2–6.

   The Access History Menu will be displayed on the CRT monitor as shown in the ILLUSTRATION 2–80**.**



ACCESS HISTORY MENU
ILLUSTRATION 2–80

2–4–8 Service Text File

Description

You can record the information for service activities using this function. The available volume of each text file is one screen of CRT monitor. The text files include:

1. Service Record File 1:
   This file is meant to keep record of all the failures/fixes carried out on the console. The precise date and information should be recorded on this file.

2. Service Record File 2:
   This file is meant to keep record of all the failures/fixes carried out on the console when the volume of File 1 is exceeded.

3. FMI Record:
   This file is meant to keep record of all the FMI carried out on the console. The precise date and information should be recorded on this file.

4. System Configuration:
   This file is meant to keep record of the system configuration, such as peripherals, probes and options installed. The precise date and information should be recorded on this file.

5. Installation Record:
   This file is meant to keep record of all the system installation, as well as problems met when installing the console. The precise date and information should be recorded on this file.

6. PM Record:
   This file is meant to keep record of all the Preventive Maintenance carried out on the console. The precise date and information should be recorded on this file.

7. Service Note 1:
   This file is meant to keep record of any service note information you desire to keep on the system. The precise date and information should be recorded on this file.

8. Service Note 2:
   This file is meant to keep record of any service note information you desire to keep on the system when the volume of File 1 is exceeded.

9. Site Provision:
   This file is meant to keep record of any specific provision or restriction of the site.

2–4–8 Service Text File (Continued)

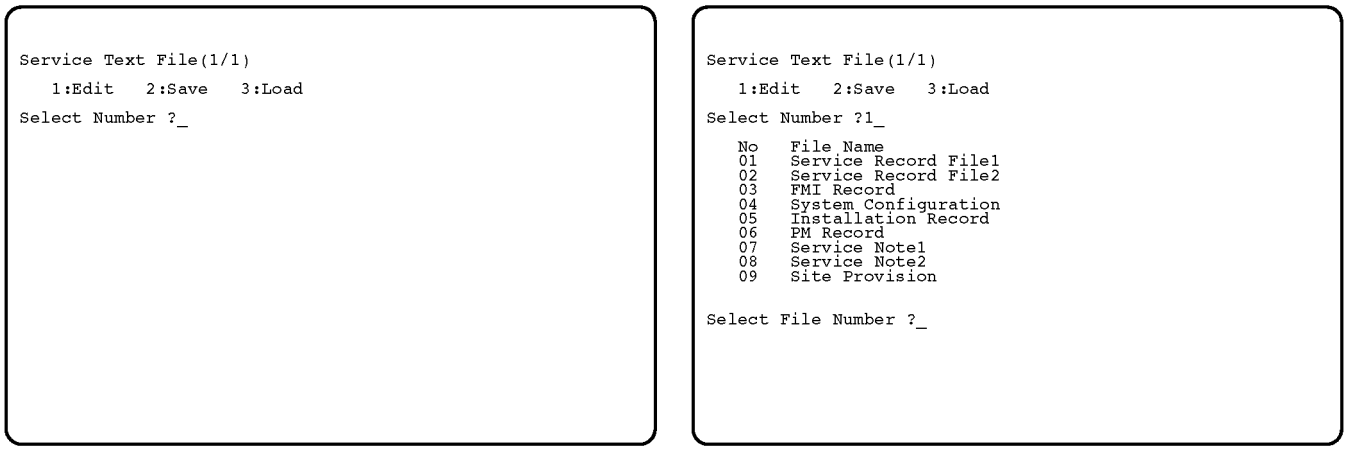
Procedure

Follow these steps to edit, save, or load the following files:

1. Service Record File 1
2. Service Record File 2
3. FMI Record
4. System Configuration
5. Installation Record
6. PM Record
7. Service Note 1
8. Service Note 2
9. Site Provision

1. Input <8> at the Service Test Menu. Refer to ILLUSTRATION 2–6.

   The Service Text File Menu will be displayed on the CRT monitor as shown in the ILLUSTRATION 2–81**.**



SERVICE TEXT FILE MENU
ILLUSTRATION 2–81

2. Input the Number of work you desire (1–edit, 2–save, or 3–load).

3. Input the File Number which will should be performed as selected by step 2.

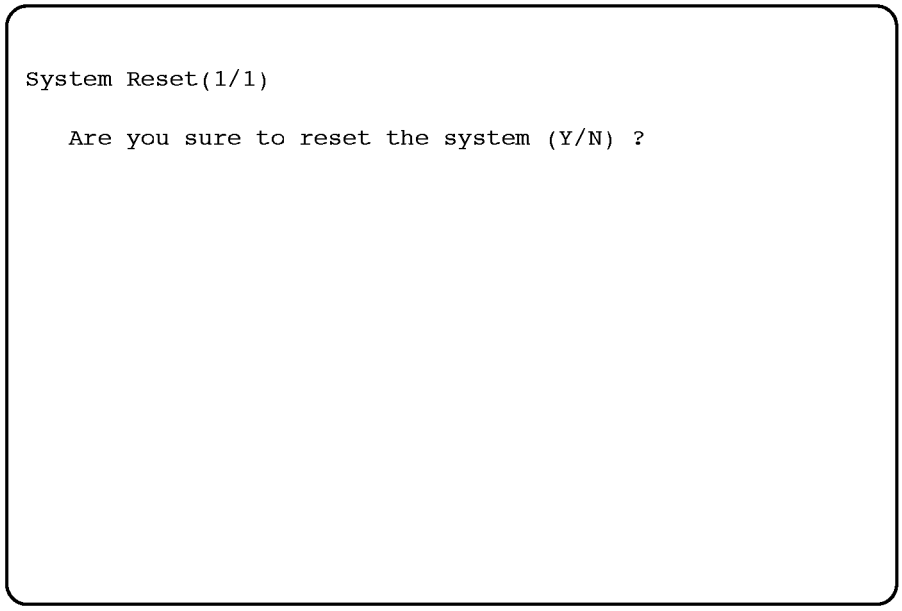
2–4–9 System Reset

Procedure

Follow these steps to reset the system

1. Input <9> at the Service Test Menu. Refer to ILLUSTRATION 2–6.

   The System Rest will appear on the CRT monitor as shown in the ILLUSTRATION 2–82**.**



SYSTEM RESET MENU
ILLUSTRATION 2–82

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3–1 SYSTEM DATA INSTALLATION

When the Time Keeper RAM or MPU Assy is replaced, the system data stored in Battery Backup RAM is deleted. It is necessary to install the system data to Battery Back-up RAM after replacing the above-mentioned parts.
This section describes the procedures for installing the system data to Back-up Battery RAM.

Note

When the battery back-up RAM is damaged by any reason and you are required to replace it, user data stored in RAM is eliminated. It is necessary to reset a part of the user defined preset parameters after replacing the battery backup RAM.

The user preset parameters which you have to reset options after replacing the battery backup RAM are:

System ID	
Service System Parameters:	Video Signal
	Power Frequency
User Defined System Parameters:	Date Format
	Time Format
	Language
	Power On Memory Test
	User ID
	Password

As for the data should be confidential, example for User ID or Password, ask users to reset those data for themselves.

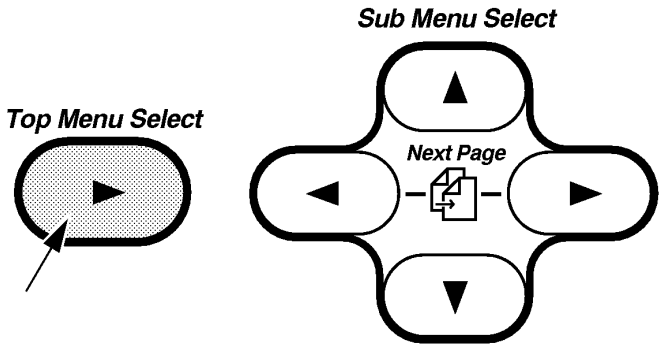
Note

It is recommended to check and record the system ID number of console using the System ID Entry/ Display function of Utility Menu when system installation or periodic maintenance. Refer to Chapter 4 of LOGIQ™ 400 Service Manual, 2127661.

3–1–1 Setting System ID Number

System ID number is peculiar to each console and is used to control the recording and storing devices.

1. Turn the main power switch of the LOGIQ™ 400 system ON.
2. Press the New Patient key to exit the New Patient Entry Menu when the New Patient Menu is displayed.
3. Press the Top Menu Select key located on the keyboard. The sub–menu selected previously is displayed on the CRT monitor screen.



SOFTWARE MENU CONTROL KEYS
ILLUSTRATION 3–1

4. Press the Top Menu Select key again. The top menu is displayed on the CRT monitor screen as shown in ILLUSTRATION 3–2.

B	Preset	Set Up	ECG	Archive	AutoSeq	CINE

TOP MENU
ILLUSTRATION 3–2

5. Select the Set Up section using the ◄ or ► key of Sub Menu Select keys. The Set Up selection is displayed in reverse video as shown in ILLUSTRATION 3–2.
6. Press ▼ key to select the Set Up Menu. The Set Up Menu is displayed on the CRT monitor screen as shown in ILLUSTRATION 3–3.

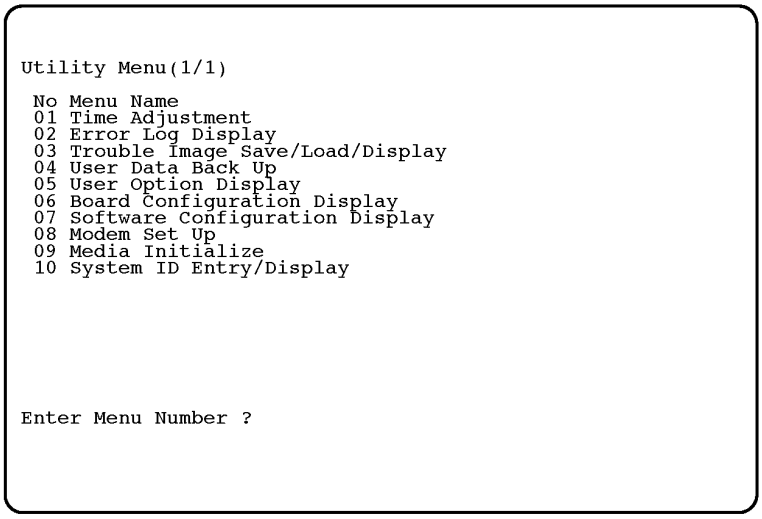
Set Up	1/1					
Custom Display	System Paramtr	Preset Program	Save Values	Utility	User Define	Diag.
▼▲	▼▲	▼▲	▼▲	▼▲	▼▲	▼▲

SET UP MENU
ILLUSTRATION 3–3

3–1–1 Setting System ID Number (Continued)

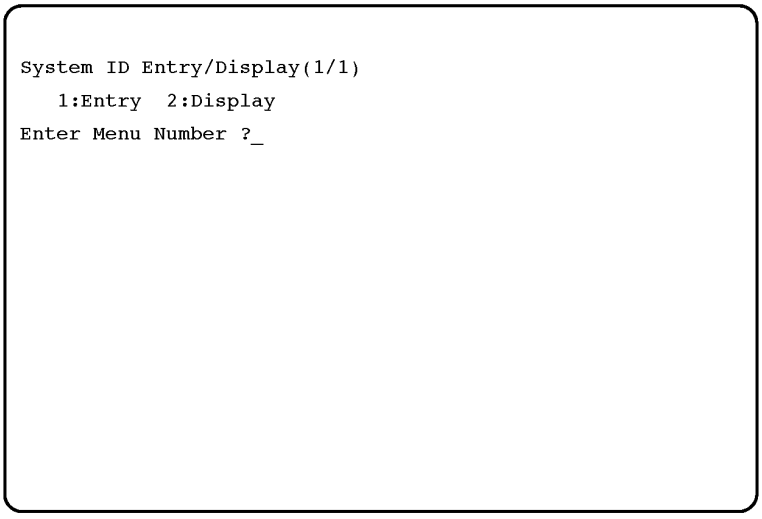
7. Select the Utility section using the ◄ or ► key of Sub Menu Select keys. The Utility selection is displayed in reverse video as shown in ILLUSTRATION 3–3.

8. Press ▼ key to select the Utility Menu. The Utility Menu is displayed on the CRT monitor screen as shown in ILLUSTRATION 3–4.



UTILITY MENU
ILLUSTRATION 3–4

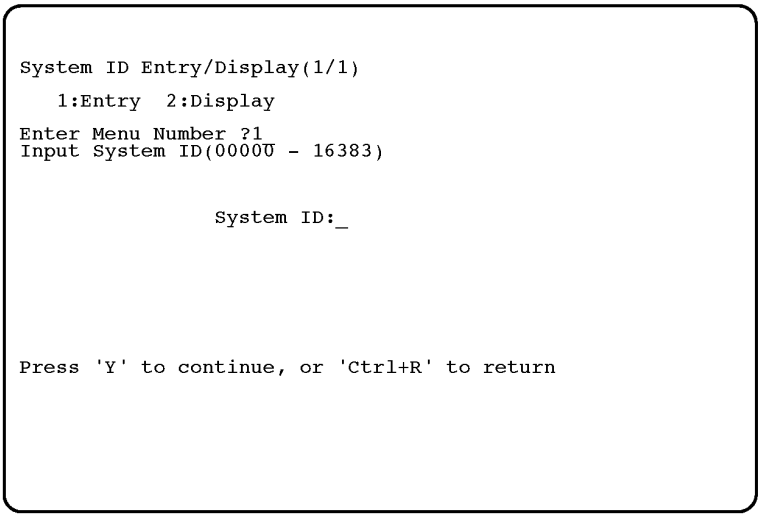
9. Type **10** and press the **Return** key. The System ID Entry/Display menu is displayed as shown in ILLUSTRATION 3–5.



SYSTEM ID ENTRY/DISPLAY MENU
ILLUSTRATION 3–5

3–1–1 Setting System ID Number (Continued)

10. Type **1** and press the **Return** key. The System ID Number Entry menu is displayed as shown in ILLUSTRATION 3–6.

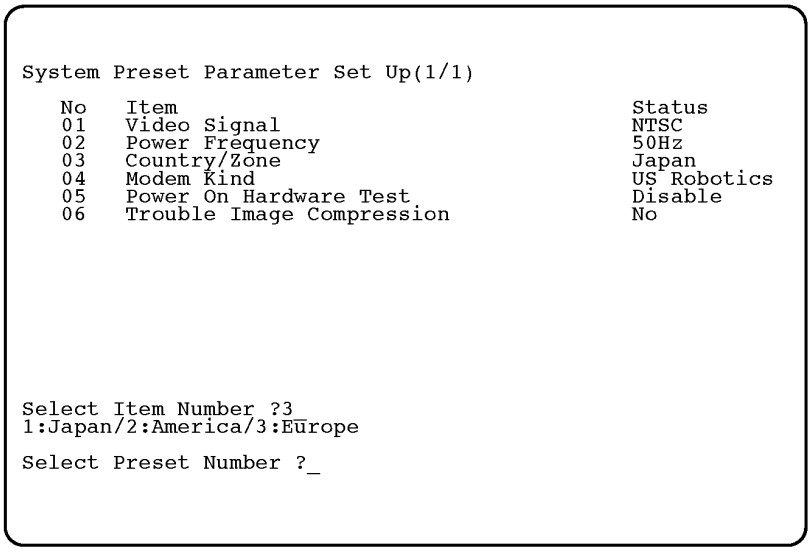

System ID Entry/Display(1/1)
1:Entry 2:Display
Enter Menu Number ?1
Input System ID(0000U - 16383)
System ID:_
Press 'Y' to continue, or 'Ctrl+R' to return

SYSTEM ID NUMBER ENTRY MENU
ILLUSTRATION 3–6

11. Type the correct ID number and then press **Return** key to set the ID number.
12. Press and hold **Control** key and then press **R** key to exit the System ID Entry/Display Menu.
13. Press and hold **Control** key and then press **R** key again to exit the Utility Menu.
14. Press the Top Menu Select key twice to exit software menu.

3–1–2 Resetting Service System Parameters

1. Enter the service mode. Refer to Chapter 2 in this manual.
2. Type **5 (05)** and press the **Return** key to select the option 5, System Preset Parameter Set Up, when the Service Menu is displayed. The System Preset Parameter Set Up menu is displayed on the CRT monitor screen as shown in ILLUSTRATION 3–7


System Preset Parameter Set Up(1/1)
No Item Status
01 Video Signal NTSC
02 Power Frequency 50Hz
03 Country/Zone Japan
04 Modem Kind US Robotics
05 Power On Hardware Test Disable
06 Trouble Image Compression No
Select Item Number ?3
1:Japan/2:America/3:Europe
Select Preset Number ?_

SYSTEM PRESET PARAMETER SET UP MENU
ILLUSTRATION 3–7

3. Type **1 (01)** and press the **Return** key to select option 1, Video Signal.
4. Set the appropriate video signal between NTSC and PAL.
5. Type **2 (02)** and press the **Return** key to select option 2, Power Frequency.
6. Set the appropriate power frequency between 50Hz and 60Hz.
7. Press and hold **Control** key and then press **R** key to exit the System Preset Parameter Set Up Menu.
8. Type **9** and press the **Return** key to reset the system when the Service Test Menu is displayed. The system automatically starts resetting.

3–1–3 Resetting System Parameters

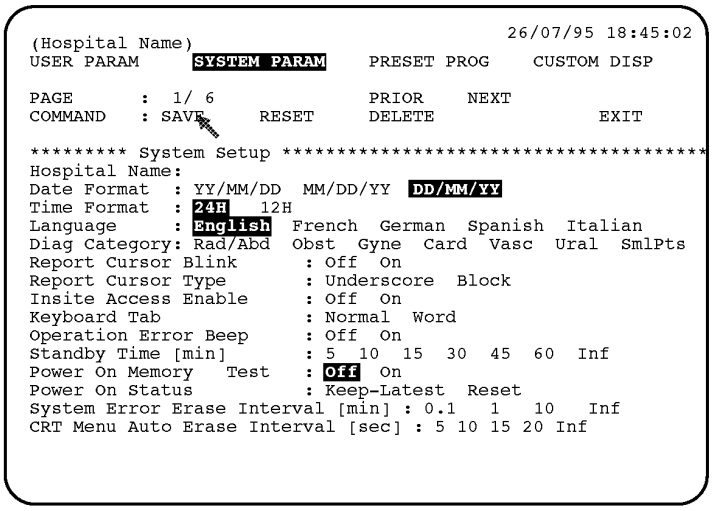
1. Press the New Patient key to exit the New Patient Entry Menu when the New Patient Menu is displayed.
2. Press the Top Menu Select key located on the keyboard. The sub–menu selected previously is displayed on the CRT monitor screen.
3. Press the Top Menu Select key again. The top menu is displayed on the CRT monitor screen. Refer to ILLUSTRATION 3–2.
4. Select the Set Up section using the ◄ or ► key of Sub Menu Select keys. The Set Up selection is displayed in reverse video. Refer to ILLUSTRATION 3–2.
5. Press ▼ key to select the Set Up Menu. The Set Up Menu is displayed on the CRT monitor screen. Refer to ILLUSTRATION 3–3.
6. Select the System Paramtr section using the ◄ or ► key of Sub Menu Select keys. The System Paramtr selection is displayed in reverse video as shown in ILLUSTRATION 3–8.

Set Up	1/1					
Custom Display	System Paramtr	Preset Program	Save Values	Utility	User Define	Diag.
▼▲	▼▲	▼▲	▼▲	▼▲	▼▲	▼▲

SET UP MENU
ILLUSTRATION 3–8

3–1–3 Resetting System Parameters (Continued)

7. Press (▼) key to select the System Parameter Set Up Menu. The System Parameter Set Up Menu is displayed on the CRT monitor screen as shown in ILLUSTRATION 3–9.


26/07/95 18:45:02
(Hospital Name)
USER PARAM SYSTEM PARAM PRESET PROG CUSTOM DISP
PAGE : 1/ 6 PRIOR NEXT
COMMAND : SAVE RESET DELETE EXIT
********* System Setup **********
Hospital Name:
Date Format : YY/MM/DD MM/DD/YY DD/MM/YY
Time Format : 24H 12H
Language : English French German Spanish Italian
Diag Category: Rad/Abd Obst Gyne Card Vasc Ural SmlPts
Report Cursor Blink : Off On
Report Cursor Type : Underscore Block
Insite Access Enable : Off On
Keyboard Tab : Normal Word
Operation Error Beep : Off On
Standby Time [min] : 5 10 15 30 45 60 Inf
Power On Memory Test : Off On
Power On Status : Keep-Latest Reset
System Error Erase Interval [min] : 0.1 1 10 Inf
CRT Menu Auto Erase Interval [sec] : 5 10 15 20 Inf

SYSTEM PARAMETER SET UP MENU
ILLUSTRATION 3–9

Note

To open the menu to page 1/5, press and hold the **Control** key and then press **1** key when another page is displayed.

8. Move the cursor to the position of appropriate option among the Date Format styles by rotating the trackball.

Note

It is desirable to make sure the appropriate option which is previously selected by user before you set options.

9. Press the **Set** key to set the selected option.
10. Set the Time Format in the same manner as steps 8. and 9.
11. Set the Language in the same manner as steps 8. and 9.
12. Set the Power On Memory Test in the same manner as steps 8. and 9.
13. Move the cursor to the ”SAVE” position and press the **Set** key to save the selected parameters.
14. Turn the system power OFF.

3–1–4 Final Procedures

1. Turn the system power ON.
2. Press New Patient key to terminate the patient entry mode when the PATIENT ENTRY MENU is displayed on the CRT monitor screen.
3. Enter the service mode. Refer to Chapter 2 in this manual.
4. Check that the settings of Video Signal and Power Frequency are set properly.
5. Exit the service mode.
6. Open the page 1/5 of System Parameter Set Up Menu.
7. Check that the settings of Date Format, Time Format, Language, and Power On Memory Test are set properly.
8. Exit the System Parameter Set Up Menu.
9. Set the system clock for LOGIQ™ 400 to the local time. For procedure of adjusting the system clock, refer to Chapter 4 of LOGIQ™ 400 Service Manual, 2127661.
10. Perform functional checks to verify that the system is functioning properly. Refer to Chapter 4 of LOGIQ™ 400 Service Manual, 2127661.
11. This completes the system data installation.

3–1–5 Setting System ID Using Laptop PC

You can also set the system ID number using Laptop PC. This section provides the procedures for setting the system ID number using Laptop PC.

Tool Required

Standard service tool
Laptop PC with terminal emulation
RS232C serial interface cable (cross type)

Note

Refer to following example or the pin assignment of Service Port described in Chapter 3 of LOGIQ™ 400 Service Manual, 2127661 and use the appropriate interface cable.

In the case of 9–pin to 25–pin interface cable:

Service Port of LOGIQ™ 400 (25–pin) :			Serial Port of Your PC (9–pin) :	
Pin No.	**Signal**		**Pin No.**	**Signal**
2	TXD	————————	2	RXD
3	RXD	————————	3	TXD
4	RTS	————————	8	CTS
5	CTS	————————	7	RTS
7	GND	————————	5	GND

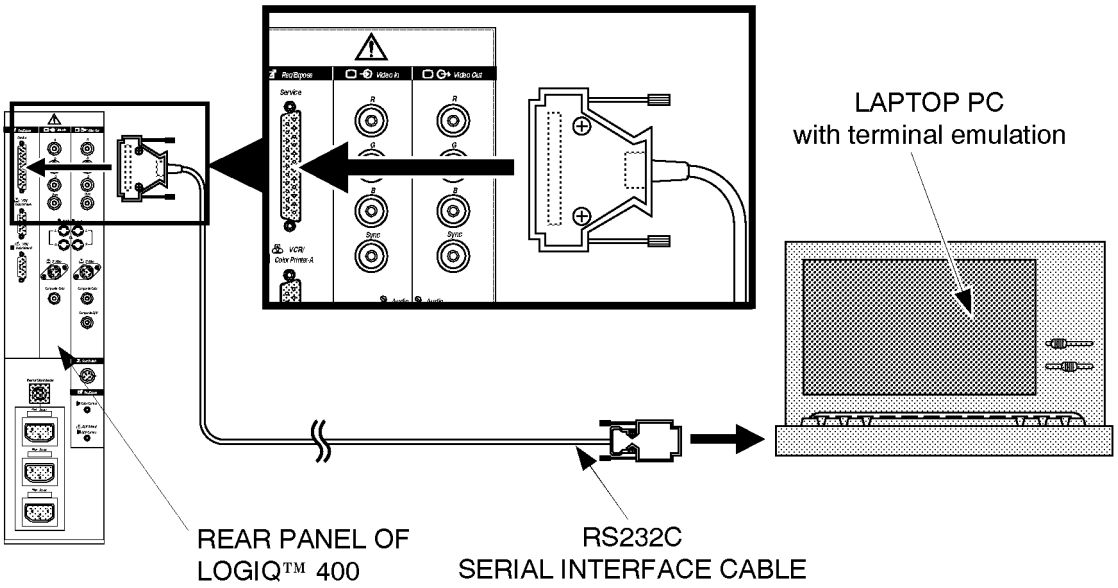
3–1–5 Setting System ID Using Laptop PC (Continued)

Preparing before Powering-Up

1. Make sure that the system power is turned OFF.
2. Connect the RS232C cable with the serial port of the Laptop PC. Refer to ILLUSTRATION 3–1.
3. Connect the connector of another side with the Service port located at the rear side of the LOGIQ™ 400 as shown in ILLUSTRATION 3–10.

Note

You may have to disconnect the insite connection.



CHARACTER TERMINAL CONNECTION
ILLUSTRATION 3–10

4. Plug the Laptop PC into a wall outlet.
5. Power the Laptop PC ON.
6. Start the terminal emulation software installed in the Laptop PC.
7. Make sure that the communication parameters are set as follows:

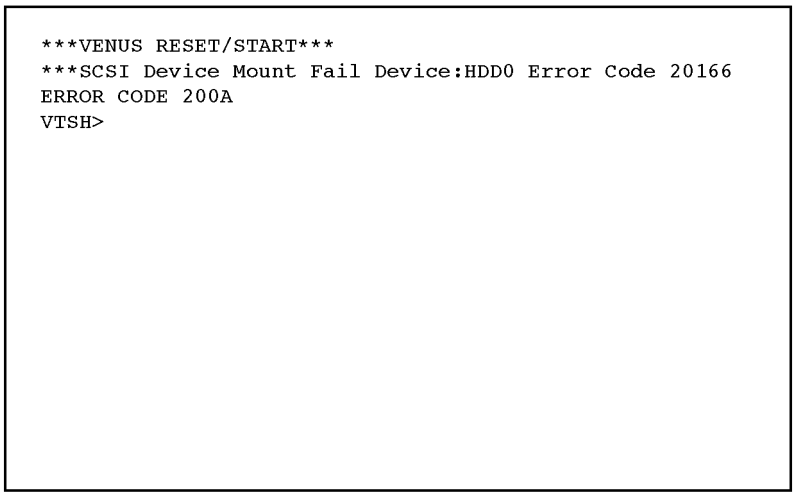
Baud Rate	:	9600 bps
Data Bits	:	8 bits
Stop Bit(s)	:	1 bit
Parity	:	None
Flow Control	:	None
Connector	:	COM1

3–1–5 Setting System ID Using Laptop PC (Continued)

Inputting System ID Number

System ID number is peculiar to each console and is used to control the recording and storing devices.

1. Turn the main power switch of the LOGIQ™ 400 system ON. The message is indicated on the display of the Laptop PC as shown in ILLUSTRATION 3–11.



MESSAGE ON PC DISPLAY
ILLUSTRATION 3–11

2. Type the following command and press the return key.

```
VTSH>MMW_FFFE000C_####
```

Note

The character "_" described in operating commands indicates the space.

Note

The characters "####" described in operating commands indicates the system ID number. The system ID number is different depending on each system.

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